



FRIDAY, FEB. 21.

CONTENTS.

ILLUSTRATIONS:	PAGE	GENERAL RAILROAD NEWS:	PAGE
The Parsons Frog.....	121	Meetings and Announcements.....	133
The Memphis Bridge.....	123	Personal.....	133
Westinghouse Double-Acting Friction Buffer.....	125	Elections and Appointments.....	134
Central New England & Western Railroad and connections.....	126	Old and New Roads.....	134
Improvements in the Burton Stock Car.....	127	Traffic.....	136
Draughtsman's Protractor.....	130		
Standard Headlight Blind and Standard Bridge Mark, Washash Railroad.....	130		
		MISCELLANEOUS:	
CONTRIBUTIONS:		Technical.....	131
A Sealing Question.....	121	Railroad Law.....	132
The Parsons Frog on the Brooklyn Bridge.....	121	The Scrap Heap.....	132
		Electricity on the Northern Railroad of France.....	131
EDITORIALS:		The Jull Snow Excavator.....	133
Guarantee of Chilled Wheels.....	128	The Pacific Railroads.....	134
A Moral from the Memphis Bridge.....	128	The Massachusetts Railroad Commissioner's Report.....	124
Seals and Loss Claims.....	129	Railroad Bridges in Massachusetts.....	124
EDITORIAL NOTES.....	128, 129	The Value of a Test Department.....	124
		The Wreck of the Peoria & Pekin Bridge.....	125
		The Purchasing and Care of Supplies.....	126
		Janney Coupler Failures.....	130
		Computing Cost of Wheel Service.....	130
		"Reversed" Blue Prints.....	130

Contributions.

A Sealing Question.

Claim Office,
Terminal Railroad Association of St. Louis,
St. Louis, Jan. 2, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the interest of the service may I ask you to say whether you can see any good reason for the practice of attaching seals at each point of interchange between roads, where car and contents go through? I have recently had claims before me where at destination one or more seals were shown of St. Louis, Halstead, Albuquerque, and other places which I do not recall. It was impossible to tell from the record whether car had been opened or not at some point on its trans-continental journey. I have been compelled, in self-defense, to adopt as a rule that my company will not join in the payment of claims unless seals passing us be shown at each end, or, if we load, that our seals be definitely shown, intact, at point of checking out. Any combination of seals with ours I object to. Am I not right, and is any other position tenable?

I have not found until now time to mention a matter called to my attention by your notice of the Claim Department rules of the Southern Railway and Steamship Association, Aug. 23, 1889, p. 557. You say: "Rule 14 provides that when shortages occur under initial seals, and count at both ends is verified, claims shall be prorated on basis of revenue earned." And then you go on to say that this has been accepted by the through lines, though for a long time the contrary practice of dividing between loading and terminal points was maintained. Now, if it has come to be the practice to prorate all losses over the entire line under the circumstances specified, it has not come to my notice, though I have done so in a few cases rather than make a fuss.

Our company handled last year nearly 216,000 loaded freight cars, of which we loaded or unloaded 85,000, the remaining 131,000 going over our line to and from connections. On a business of such magnitude many claims arise, and this question has had my careful attention. Five years ago I sent the following questions to our immediate connections:

1. Where car goes through to destination with seals of the company loading contents intact, and contents check short, how is loss adjusted, i. e., who pays—company loading, company unloading, or both, and in what proportion?
2. Where there are intermediate lines, over which car passed sealed, do they participate, and to what extent?
3. What is your usual course with regard to freight damaged under a similar condition of seals?

The following is a sample of the answers received:
" . . . We have no regular rule. We come in contact with a great many roads having different methods of settling these disputed points; and in the interest of harmony, fair dealing and prompt settlements, we generally join in any plan which they prefer."

Most of the answers were just as indefinite as this, but I needed some rule, and so adopted for business loaded or unloaded by our company what seemed to be the Trunk Line practice, viz.: 50 per cent. each to initial and terminal, and we have so settled right along, even fighting with the Southern lines to maintain my position. Now you come along and unsettle me by saying that the Trunk lines have changed front. I am not unwilling to do so also, but I want a fair show.

S. D. WEBSTER.

[Some comments on this subject will be found in the editorial columns.—EDITOR RAILROAD GAZETTE.]

The Parsons Frog on the Brooklyn Bridge.

NEW YORK, Jan. 26, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Jan. 24, speaking of a switch and frog now in operation on the Brooklyn Bridge, you state that

the frog is moved by a rack and pinion making a half revolution. In this you are mistaken, as the rack on the frog is on the under side and operates on a gear placed longitudinally, the shaft of which engages a worm gear under the pivoted rail and thereby moves the frog positively and locks it in position securely. Accompanying this you will find a sketch which gives the correct operation.

Believing your authority to be of the best, and knowing that by some means a mistake has crept in, I desire to state that the switch and frog were manufactured by the Parsons Block, Switch & Frog Co., under my personal supervision, the only changes being in the pitch of the worm, and modifications to meet the wish of the bridge engineers to do away with webbed rails and swing on a pivot, for rapid handling in making changes. Otherwise it is the same frog as shown in your issue of Aug. 16, 1889. For heavy road work this pivoted frog would not have the strength of the frog previously illustrated, as in it the pressure of the flange against the rail would always be outward, and in the sketch this rail is shown so slotted into the plate that it would be impossible to stir it when in position. HENRY F. PARSONS.

Electricity on the Northern Railroad of France.

The exhibit of the Northern Railroad of France, at the Paris Exhibition, was very complete and valuable, but perhaps the most important and interesting feature of this exhibit was that showing the varied and extensive uses made of electricity. It has been applied to a great variety of purposes, for which it is not employed, as far as we are aware, by any railroad in this country. The success which has been attained is both instructive and gratifying. The facility with which this force can be transmitted to any desired distance, and under circumstances where no other would be available, makes it peculiarly serviceable. In this country we are only beginning to discover how conveniently (and how economically, in many instances) it may be applied. We know of some railroads which have every station supplied with electric signals, used as station blocks, with which all the switches are connected. We know of one which has the entire length (about 50 miles of double track) supplied with Union rail-circuit signals with overlapping blocks, and there are several special applications where unusual conditions exist. There are also many highway crossing alarm bells. No other road in this country, we feel sure, is so fully furnished with electric signaling apparatus as the one here mentioned, but compared with the Northern Railroad of France, its equipment is very meagre. Nearly all the electrical work in France is done by means of open-circuit batteries, the expense of their maintenance being very much less than that of constant-current batteries.

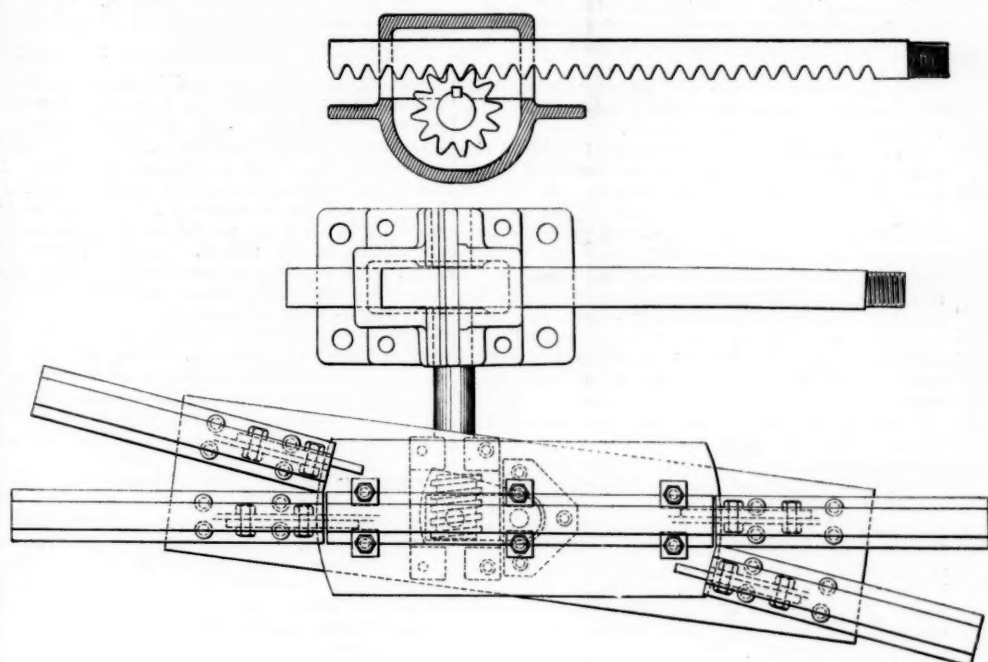
The following are the principal applications shown and described by the company in its exhibit:

I. *Electric Semaphore Block Signals.*—Each semaphore signal is furnished with a distant disc signal. A prominent feature is the interdependence of the signals. Setting a semaphore signal at danger is done mechanically by turning a crank. This causes to appear at a signal station in advance an indicator which signifies that a train is approaching. The signal is reversed by an electric current, but cannot be returned to the all-clear position except from the next signal station in advance. It will be observed that this is not quite so complete as the Sykes lock and block signals recently introduced on the New York, New Haven & Hartford railroads. In this ap-

pliance the signal is moved in both directions mechanically, but when once put in the danger position cannot be moved except when unlocked by the next man in advance, which unlocking he cannot do until the expected train has arrived and gone past his signal. The French application supposes that the signal man will not restore the preceding signal to the all-clear position until the train, to protect which it was set, has entered the next section. The American application provides that he cannot do this even if so inclined. The apparatus used consists at each station of two large arms which are positive stop signals and apply to the trains in each direction, and two small arms which are merely tell-tales for the stop signals at the station next in advance and in the rear.

Each such signal requires a battery of 12 Leclanché cells. The signal posts are 20 to 36 ft. high, and each carries at the top a large arm, which is connected by a wire circuit with the small one at the station in the rear, and a small arm lower down, connected with the large arm of the station in advance. There is, besides, a small electric bell, which serves to transmit a pre-arranged set of signals between the men when desired. The method of night signaling is by red and green lights. The apparatus was described and illustrated and the manner of its use explained in the *Railroad Gazette* several years ago. On this road an improvement has been added, so that the system now provides that the small arm shall not be operated until the large arm has made its corresponding movement. Each large arm is connected with a disc signal, which is to be looked upon as substantially a distant signal for the semaphore, but which is, however, independent of it, so that the disc can be put to danger whether the semaphore be used or not; but the semaphore cannot be put in the stop position without first placing the disc so. The disc signal cannot be restored to the all-clear position until after the semaphore has been changed to all clear, and this cannot be done unless it has been unlocked by the next man in advance. This normal interdependence of the different parts of the apparatus can, however, be interrupted when it is necessary (as when placing a train on a siding, or for other reasons), but in this case a bell rings continuously while the changed condition exists, to call attention to the fact that the normal relations between the signals are at that moment interrupted. Some signals are also furnished with electric repeaters, by which the indications of the signal are made known at a distance. The Northern Railroad of France operates about 600 miles of double track with block signals. The total length of track owned by the company is 3,738 km. (about 2,318 miles), of which 3,500 (about 2,225 miles) are operated. The line is equipped with 575 of these electric semaphore signals in sections averaging about two thousand metres in length. Where a signal is so situated that it cannot be well seen by the person for whose information it is intended, or where it is desirable for other purposes, an electric repeater is used, which is in its movements very like a miniature small arm signal. There are twenty such repeaters in use.

II. *Electric bells* have been used since 1865 to announce trains at the principal stations and at other places for the information of station agents and others. These are used in addition to the normal equipment of apparatus, and not as a substitute; therefore their use does not dispense with any of the precautions which the rules prescribe. Each bell strikes one or more blows on a gong or bell, and displays a visible signal in the form of a small semaphore arm. Both batteries and magneto-electric machines are used as sources of electricity for the operation of the electric bells. Electric repeaters are sometimes attached to these bells when it is desired that



THE PARSONS FROG.

their communications should be available in more than one place. There are in actual service 1,470 bells on single track lines, and 876 bells for double track service, in addition to which there are 94 repeaters. Several of these repeaters are fitted with a trumpet, sounded by compressed air, where the sound of a bell would be liable to be confounded with that of others.

III. All danger points are protected by distant signals. In times of fog or severe storms these may not be seen. It is therefore important to supplement them by apparatus capable of giving an alarm to the engineer and bring a train to a standstill if the train should pass a danger signal. There is provided, therefore, for all the trains furnished with a continuous vacuum brake, an attachment by which, if the engineer should disregard a signal at danger, brakes would be applied to the whole train at once by the opening of a valve, which is ordinarily held closed, but which is opened by the current which is caused to pass through an electro-magnet whenever the train passes a signal at danger. Eighty-nine engines have been fitted with the necessary apparatus and about one thousand signals are furnished with this controlling device. At each of these signals there is an electric contact-plate called a "crocodile," which is placed between the rails at a short distance before reaching the disc signal. It is therefore in the power of the signal man, by putting a disc signal to danger, to insure that if the train should disregard that signal it will be brought to a standstill before reaching the semaphore. A modification of this device allows the conductor to apply the brakes by an electric apparatus running through the train. When the distant signal is put to danger it connects the circuit in such a way that he could apply the brakes to the train if the signal should be passed.

An ingenious attachment provides besides this, that when a train passes a disc signal that has been set all clear it simply announces the train at the next station.

IV. The rules of many of the French railroads prescribe that disc signals shall be set to danger as soon as a train passes them. To call attention to this duty, as well as to announce at a station the approach of a train, especially where the disc signal cannot be seen, some of these are connected with a bell at the station, which rings whenever a train passes the disc signal, whether that signal stands at danger or safety. A special indicator shows the position of the signal, and there is a different communication for a signal which stands at danger from that which is given when the signal is all clear, so that the train is not only announced at the station in advance, but the position of the disc signal is also known, which serves to keep negligence in check. Thirty-five signals are thus equipped.

V. A device is also made use of to indicate at a station that such or such a track is occupied. This is accomplished by an indicator, and for night signals by a revolving lantern, which makes one fourth of a revolution by means of the electric current, and indicates that the track specified is or is not clear.

VI. Switches, being sometimes a long distance away from the man who operates them or from the station to which they belong, it is important to know whether the points of a switch are properly set against the rail. This is done by electric devices so arranged that if the switch rails are not set in close against one or the other of the main line rails, a bell is caused to ring in the cabin of the switchman. The bell also rings one or two strokes while the switch is being moved from one position to the other, which shows that the electric apparatus is in working order. One thousand seven hundred and fifty-five switches are furnished with this device.

VII. When an absolute block signal is located just outside a station or yard, a special signal is usually provided to govern the movement of trains in the yard, which is controlled by the stop signal and by the disc signal. These are connected with the regular semaphore signal, so that when the semaphore stands at danger the disc signal and the special signal must be so too. An electric circuit serves to connect the two signals. They may be disconnected from each other whenever desired, and then the special signal is used for the purpose of switching, etc., but the semaphore cannot be put clear until the electric circuit has been restored. There is also a warning given of the stop signal which controls the position of the special signal, being disconnected whenever the connection is interrupted. Notice is given at the switches, etc., whenever the semaphore signal has been set clear for a train, so that the switchman shall not interrupt the connection when a train is approaching. There are 134 of these devices in use at 51 stations.

VIII. To each distant signal is attached an electric bell, which rings whenever a signal is set to danger. If the bell does not ring when the lever is thrown to move the signal, the signal man is expected to notice the omission and to seek the cause. Batteries which operate these bells are placed at the foot of the signal posts. Being open-circuit sal-ammoniac batteries, there is no danger of freezing. Positive block signals are furnished with a back light, which shows blue if the signal is all clear, and white when it stands at danger. In order that the signal men may have still further security against mistaking the position of the signal, an electric indicator is also attached which shows in the tower the movements of the signal by means of a disc corresponding in color to that of the signal, and a bell also rings when

the signal is not in its normal position. These instruments are applied to 683 stop signals, 57 cautionary signals, and there are 43 indicators.

IX. For the needs of signal men in large yards and for communication between the points where there is only required the transmission of one or a few phrases prepared beforehand, as for instance in a large yard where the signal men should be informed of the position of switches, etc., which are beyond the limit of his vision, the company uses three kinds of apparatus. The first has a separate wire for each signal to be transmitted. This is used where the distance does not exceed 300 to 400 metres. A series of discs about 6 cm. in diameter have printed on their faces a message or information which the signal is intended to convey. These discs are brought into view one at a time by pressing on a series of buttons at the further end of the line. Below each disc is a button which is to be pressed in answering the signals, and between the disc and its button is a rectangular plate which has inscribed upon it the words which the answering button will bring into view at the other end of the line. There are besides two special buttons, one of which gives the signal "Error; I repeat," and the other "Wait." There is an electric bell which rings for all the indicators alike, to call the attention of the signal man to the fact that a signal has been received. This type of apparatus for communication is used for two purposes. For communication between the signal men it is so arranged that when a signal is given from either end, it makes the same signal appear at both ends of the line. It is acknowledged by pressing upon a button immediately below the little disc which comes into view and shows the signal. This rings the bell at the further end of the line and causes both discs to disappear. When, however, it is used for the purpose of communicating to the yardmaster the momentary occupancy of a certain track in the station, it is so arranged as to bring into view a disc bearing the inscription, "Track number so and so is occupied," and the bell also rings as long as the signal remains in sight. It can only be effaced by the agent at the place from which it was sent pressing upon another button there, which causes the disc to disappear.

When the distance between the points is more than 500 metres, an instrument is used very similar in principle and operation to the dial telegraphs which were used in this country so extensively a few years ago. The same instrument serves as a transmitter and a receiver. It is attached to the wall in the office and is divided into 30 sectors. Around the outside of the sectors push buttons are arranged, while still further from the centre are a series of circular cases or tablets, the whole forming two concentric circles. In the centre of the dial is a needle adapted to move around the face, and in the circular cases are incised the messages which are received by this instrument, while on the sectors are printed those which it transmits. There is a special button which serves to bring the needles back to the zero point, whatever may be their position. Two instruments are used, one at each end of the line, precisely alike except that the conventional signals inscribed on the circular cases of the one correspond to those on the sectors on the other. When the person at one end of the line presses one of the buttons around the outside of the instrument (that one being chosen which corresponds with the message he wishes to send), the needles of both instruments are released and go around the dials until they arrive at a point opposite the button which has been pressed, where they come to rest; the person at the other end of the line acknowledges the receipt of the signal by pressing on the same button of his apparatus; the needles then make a complete circuit of the dial and come to rest again where they were before; then the person who has given the signal presses on the special button, which brings both needles again to the zero point. This instrument requires a battery at each end of the line, but only one wire between them. Each instrument is besides provided with a bell, which rings at the same time the needle makes its movement.

When only one signal in each direction is to be transmitted, it is desirable that it should be both optical and acoustical.

For this case there is used at each end of the line (A and B, for example) an instrument which consists of a call button surmounted by a circular opening, before which a small disc appears when the button at the distant end of the line is pressed. The two instruments are connected by a single wire, and are so arranged that the following results are obtained: When the button, for example at A, is pressed, the discs appear at both A and B, and the bell rings at B. Pressing on the button at B causes both discs to disappear and rings a bell at A. Signals in an opposite direction are transmitted and received in a precisely similar manner.

(TO BE CONTINUED.)

The Memphis Bridge.

The Memphis Bridge now building will be the first bridge to cross the Mississippi below the mouth of the Ohio; but it will be remarkable for other reasons. It will have one span of 790 ft. 5 in. and two of 621 ft. 0½ in. each in length. Aside from the Brooklyn and Niagara Suspension bridges and the Forth bridge, these will be the longest spans ever built. The charter requires the bridge to be 75 ft. above high water, which is 22 ft. higher

than has ever been required for any bridge heretofore built on the western rivers. On the Ohio the requirement is 53 ft. The superstructure, beginning at the eastern or Tennessee shore, will be as follows: One anchorage span from the anchorage pier to pier 1, 225 ft. 10 in. long. The span from pier 1 to pier 2 will be 790 ft. 5 in. long. This is composed of two cantilever arms, each 169 ft. 4½ in., and an intermediate span 451 ft. 8 in. long. From pier 2 to pier 3 will be a continuous truss span 621 ft. 0½ in. long with cantilever arms over piers 2 and 3, each 169 ft. 4½ in. long. The western span of the continuous superstructure will be 621 ft. 0½ in., the same as the central span. This will be made up of the cantilever arm before mentioned, 169 ft. 4½ in., and of an intermediate span 451 ft. 8 in. long, one end of which will be hung from the cantilever arm, and the other will rest on pier 4. West of pier 4 will be a deck span 338 ft. 9 in. long.

The entire length of the continuous superstructure, aside from the deck span, will be 2,253 ft. 8 in.

The continuous superstructure will be rigidly fastened to piers 1, 2 and 4, but will rest on expansion rollers on pier 3. Slip joints will be provided for expansion at the suspended ends of the independent spans.

The trusses will be placed 30 ft. between centres and will be divided into panels 28 ft. 2½ in. long.

The deck span trusses will be placed 22 ft. between centres. The east end of this span will be carried in niches on the west side of pier 4; the west end will have roller bearings over the centre of pier 5. This span will include a vertical bent which will carry the west end of the west pair of stringers.

The estimated approximate weight of the continuous superstructure is 13,000,000 lbs.; that of the deck span 1,000,000 lbs., making the total estimated weight of the superstructure of the bridge proper 14,000,000 lbs.

All parts, except nuts, swivels, clevises and wall pedestal plates, will be of steel. The nuts, swivels and clevises may be of wrought iron, but shall have sufficient strength to break the bodies of the members to which they are attached. The pedestal plates will be of cast iron.

The steel will be divided into three classes: First, high-grade steel, which will be used in all the principal truss members; second, medium steel, which will be used in the floor system, laterals, portals, transverse bracing and the lacing of the truss members; third, soft steel, which will be used only for rivets, and at the option of the contractor where wrought iron is permitted. The bolsters which carry the large pin bearings on piers 1, 2 and 3, will be of cast steel. In any case where it seems doubtful what quality of steel is required, high-grade steel must be used.

Steel may be made by the open hearth or by the Bessemer process, but no steel shall be made at works which have not been in successful operation for at least one year. In the finished product of open-hearth steel the amount of phosphorus shall not average more than 1/100 of one per cent., and never exceed 1/50 of one per cent.

In the Bessemer steel, the amount of phosphorus shall not average more than 1/100 of one per cent., and never exceed 1/50 of one per cent.

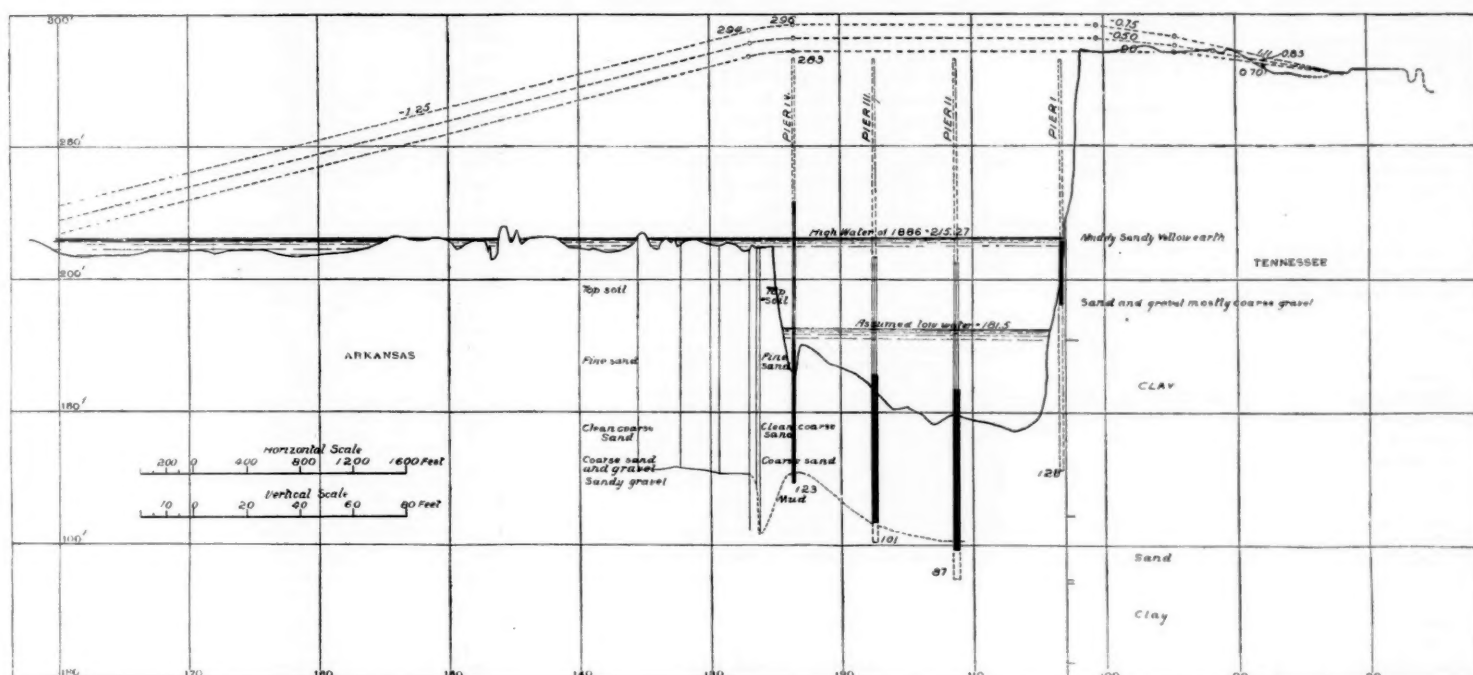
The laboratory test shall meet the following requirements:

	Highest Grade Steel.	Medium Steel.	Soft Steel.
Maximum ultimate strength, pounds per square inch.....	78,500	72,500	63,000
Minimum ultimate strength, pounds per square inch.....	69,000	64,000	55,000
Minimum elastic limit, pounds per square inch.....	40,000	37,000	30,000
Minimum percentage of elongation in 8 inches.....	18	22	28
Minimum percentage of reduction at fracture.....	38	44	50

Steel for pins shall be sound and entirely free from piping. All pins in the main trusses shall be drilled through the axis.

The laboratory tests of the cast steel shall show an ultimate strength of at least 70,000 lbs., an elastic limit of at least 40,000 lbs. and an elongation of at least 15 per cent. in 8 in., and a reduction of 18 per cent. at point of fracture.

All riveted members which are made of high-grade steel and all other pieces connecting with such members shall be solid drilled, no punching whatever being allowed, excepting lacing bars, which may be punched and reamed. Where bolts passing through the metal are used the holes shall be drilled in all metal more than three-quarters of an inch thick, the diameter of the drilled hole to be at least one-eighth of an inch less than the diameter of the finished hole. In metal not more than three-quarters of an inch thick punched holes may be used for fitting up, the diameter of the punched hole not to be more than three-quarters the diameter of the finished hole, and the number of punched holes never to exceed eight in any one plate or four in one flange of any one angle. After the drilling is completed a special reamer shall be run over both edges of every hole, so as to remove the sharp edges and make a fillet of at least 1/16 of an inch under each rivet head. In general, all holes which are to pass through several thicknesses of metal shall be drilled with all those pieces of metal assembled in the exact relative position they are to hold in the bridge. All rivets shall be driven by power wherever this is possible. Tightening by calking or reupping will not be allowed. This applies to both power-driven and hand-driven rivets. All pin holes and holes for turned bolts passing through the whole width of a riveted



PROFILE OF THE SITE OF THE MEMPHIS BRIDGE, SHOWING DEPTH OF FOUNDATIONS ON FEB. 7.

member shall be bored or drilled after all other work is completed. All riveted members which are composed entirely of medium steel may be punched and reamed; but this does not apply to the connections between such members and high grade steel members, which connections shall be solid drilled throughout.

The heads of eye bars shall be formed by upsetting and forging. No welds will be allowed. After the working is completed the bars shall be annealed in a suitable annealing furnace by heating them to a uniform dark red heat and allowing them to cool slowly. The thickness of the head shall not be more than $\frac{1}{8}$ in. greater than that of the body of the bar, and the heads shall be of sufficient strength to break the body of the bar. Nuts, swivels and clevises, if made of steel, shall be forged without welds; whether made of steel or wrought iron, one of each size shall be tested and be of sufficient strength to break the bars to which they are attached. Twenty full-sized steel eye bars shall be selected from time to time from the bars made for the bridge by the inspector for testing.

The tests of full-sized eye bars shall be made in the large testing machine at Athens. These bars will be required to develop an average stretch of 12 per cent. and a minimum stretch of 10 per cent. before breaking. The elongation shall be measured on a length of not less than 20 ft., including the fracture. The bars will be required to break in the body. They shall also show an elastic limit of not less than 32,000 lbs. and an ultimate strength of not less than 62,000 lbs., as indicated by the registering gauges of the testing machine at Athens. In the case of bars too long for the machine, the bars shall be cut in two, each half reheated, and both halves tested in the machine, the two tests, however, to count as a single test bar. If the capacity of the machine (estimated at 1,200,000 lbs.) is reached before the bar is broken, the bar shall be taken out of the machine and the edges shall be planed off for a length of 10 ft. at the centre until the section is reduced to the equivalent of 16 sq. in. of section of the original bar. The bar shall then be placed in the machine and broken; when this is done, the elongation shall be measured on a length of 8 ft. and an ultimate strength of 60,000 lbs. computed on the 16 in. of original section will be considered satisfactory.

We have given above a few extracts from the very full and minute specifications for the superstructure prepared by Mr. George S. Morison, the Chief Engineer. The contract for the superstructure has been let to the Union Bridge Co. The contract for the masonry has been let to Mr. L. M. Loss. The owners of the bridge, the Kansas City & Memphis Railway & Bridge Co., are putting in the foundations, and Mr. Alfred Noble is Resident Engineer in charge of the work. The caissons, which are 47 ft. x 92 ft., are being sunk by the pneumatic process, and the work is progressing rapidly. The condition of the work on Feb. 7 and the nature of the material through which the foundations are sunk are shown on the profile herewith. It will be seen that on that date the following depths below high water had been reached. The shaded portions show the foundation work actually done; the full lines show the masonry done:

	Pier 1.	Pier 2.	Pier 2.	Pier 4.
Depth, Feb. 7, ft.	25	116	106	92
Final depth, ft.	87	127	113	92

In sinking the caissons, one novel expedient has been employed with great success. Before each caisson was sunk a bed was prepared for it by sinking a mattress on the site. Each of these mattresses was 240 ft. by 400

ft. They were made in the usual way, of willow and other brush, woven together and bound by wire. The mattresses were built from barges and anchored over the pier sites, and then loaded with stone from barges floated over them till they sank to the bottom. When the weaving was completed, a mattress was loaded with stone until only a few points projected above the surface of the water. Then the barges carrying rock were hauled across the upstream end of the mattress, stone being thrown from them so as to depress this portion of the mattress below the surface of the water. The extreme upper end of the mattress was prevented from sinking altogether by lines attached to the mooring barges. After they had been placed in position the barges of stone were allowed to float slowly down with the current, stone being thrown from them by a large force of men. When the upper half of the mattress had been sunk below the surface of the water the lines connecting its upper end with the barges were cast loose and the mattress sank immediately. The upper end of the mattress was attached to anchors a few hundred feet upstream by lines passing under the mooring barges.

The caissons were sunk on the carpets so prepared, and excavation proceeded through the stone and mattresses, and into the sand.

The objects sought in the use of the mattresses were: First, to prevent scour before the caissons could be landed on the bed of the river. Had they not been used the bottom of the river would have scoured under the upstream end of the caisson, and when grounded it would have been several feet out of the level. Second, to prevent scour after the completion of the pier, and thus to further insure its stability. At the time the mattresses were being constructed the current was slight. The bed of the river for a depth of thirty to fifty feet is coarse sand.

The caissons were of unusual size, 47 ft. by 92 ft. The rate of sinking was limited by the progress made in building the masonry, and averaged about 2 ft. per day. It is considered that the success with which the caissons have been sunk has been very largely due to the use of the mattresses. Moreover, a carpet is formed around each pier, from 100 to 150 ft. wide, on which riprap may be placed.

The Jull Snow Excavator.

Notwithstanding the wonderfully open winter which we have had so far, the severe experience on the far western lines of the Union Pacific gave an opportunity for a very thorough test of the capacity and endurance of one, at least, of the new machine snow plows.

The Rotary, having been in use several winters, we no longer call new; but until this winter the Jull Excavator had had no serious test in service except some quite limited in extent and in duration, which took place last winter on the line of the Rome, Watertown & Ogdensburg. The result of those trials was in every way favorable, and established the right of this machine to the serious consideration of railroad officers on whose lines the snowfall is liable to be great or badly drifted.

The first Jull Excavator was sent to the Union Pacific last November, for use on the Kansas Pacific Division. It was housed at Ellis, Kansas, no occasion arising to take it out. On Jan. 11 it was ordered west to aid in opening the blockade, and encountered the first snow just west of Granger, Wyo., Jan. 16. From Granger

to Huntington the distance is 541 miles, and here a great deal of snow was encountered, at intervals drifted from four to five feet deep. The Jull machine passed over this part of the line with two engines and with no serious delay to its rapid progress. In this journey it had its baptism of blood, which we suppose will be necessary for all of these machines. A steer was caught on the track and cut in two by the cone, which was making but 75 revolutions per minute. The fragments were thrown off the track, and no injury or delay was caused to the machine. This, perhaps, was not quite so complete a baptism as that of the Rotary. That machine encountered a herd of Texas cattle, and strewed the country for miles with beefsteaks—at least that is what the reporters said.

From Huntington to Baker City, 47 miles, drifts were encountered which were heavy and compact, averaging about 6 ft. deep. These were passed steadily at about 8 miles per hour. The excavator reached Baker City, Ore., on the morning of January 18 and was received with considerable enthusiasm by six train loads of passengers who had been imprisoned there for nine days. It left Baker City the same afternoon, encountering many drifts from 6 to 12 ft. deep and from a quarter to a half mile in length, of very compact snow. One drift between Haines and North Powder was about a mile and a half long. From Tallacessett to Union, about 6 miles, the worst drifts were found; here the snow was from 8 to 25 ft. deep, having drifted, thawed and then frozen. It is said that no difficulty was experienced in opening this part of the road. Before reaching Union was a snow shed packed with hard, drifted snow. This, we are told, was cleared without any trouble. The only delay in this run was for water, it being necessary to melt snow as the water in the tank gave out. It was necessary to keep the machine plows running constantly on the line already cleared, as the drifts continued to form.

Having opened the road to La Grande, the Jull machine was sent to Pendleton to open up the branch to Walla Walla, as was mentioned in our item on this subject last week. Here 42 miles of road had been under snow for three weeks. The Jull Excavator left Pendleton at 11 p. m. and arrived at Walla Walla at 7 o'clock next morning, having plowed through 10 miles of drifts averaging 7 ft. deep that had been in place freezing and consolidating for 21 days.

It is said that no officer or representative of the Jull Company was on or near the machine from the beginning to the end of this work, and that it needed no repairs except the tightening of nuts and the changing of brasses. But two engines were used to push the machine in the worst snow. It must be remembered that this was the first Jull plow built, and it went into service just as the inventor designed it. In this light its performance is quite remarkable.

For confirmation of any of the facts that are given above we are referred to various officers of the Union Pacific, including Mr. Holcomb, Vice-President, and Mr. Cushing, Superintendent of Machinery. It is said to be the purpose to use the machine during the coming summer to handle drifting sand on the line of the Oregon Railway & Navigation Co.

The Jull Excavator was placed in the hands of the Union Pacific Co. with the understanding that if the work it accomplished was not all that had been claimed for it, the Union Pacific should at its option keep or reject the plow. The check in payment was forwarded the day that the endorsements recommending the ex-

cavator and detailing the work done by it reached Omaha, which is of itself all the endorsement that the Jull Company could ask.

The Pacific Railroads.

The seventh special committee on Pacific railroads has agreed upon a report and a refunding bill. With regard to the Union Pacific, the report says, that the policy of building branch lines was wise, and has not at least not recently, been abused; that the Oregon Short Line in particular was not a menace but an advantage to the government interests; that there is no evidence of any purpose on the part of the company to surrender that portion of their road over which the government has a statutory lien; on the contrary, every reason tending to satisfy any candid person that no such purpose exists; that this is a capable, well managed road, abundantly able to pay its debts, requiring only, like every other railroad, time in which to pay; that the present management is honestly trying to effect a fair adjustment with the government; that the interests of the government and of the railroad company will be promoted by a settlement, and that one can be made now under which every dollar of the government debt, with interest, will be paid.

The Central Pacific has not an ability to pay at all equal to that of the Union Pacific, but, under the terms of the bill to be reported, can make final and full payment with reasonable certainty.

The security for the Union Pacific debt is not enough to protect the government debt, if it shall not be adjusted until it becomes due, within \$50,000,000, while under the bill to be reported the security obtained will be twice the government debt in value, and the payments, according to the terms of the bill, absolutely certain. The Central Pacific security is still less satisfactory. It consists of a statutory lien on a road commencing at a point five miles west of Ogden, and extending to San Jose, without terminal facilities at either end, made subject to a mortgage to secure bonds equal in amount to the original indebtedness of the company to the United States. That portion of the road from Ogden to the westerly slope of the Sierra Nevada is practically only a bridge, without any local business of any amount. The roads reaching from the main line into Nevada do not now pay their actual expenses. A foreclosure of the first mortgage would substantially exhaust, in satisfaction thereof, the entire property. It would be inexpedient for the United States to redeem it from said first mortgage, or to become the owner of the property through redemption and foreclosure.

The report finds that it is expedient, necessary and practicable to adjust and further secure the indebtedness to the United States upon extended time, at a reduced rate of interest within the ability of the company to pay, upon such terms as to advance the development of the country through which such roads pass, and afford the inhabitants thereof reasonable rates of transportation for passengers and freight.

The bill agreed upon provides for finding the present worth of the indebtedness of the Union Pacific Railway Co. on the first day of July, 1890, and for the payment to the United States of that amount, with three per cent. interest, payable semi-annually; also a portion of the principal semi-annually, so that the entire debt shall be paid in 50 years.

It requires that the Union Pacific Railway Co. shall give a mortgage on all its property, of every name and description, real, mixed and personal, and also preserves to the United States its present statutory lien.

In event of the failure of said company to accept the provisions of the act, there shall be carried to the credit of the sinking fund one-half of the compensation for services rendered for the government, and in addition thereto, the sum of \$2,000,000 a year, or 75 per cent. of the whole net earnings of the Union Pacific, extending also the provisions of the Thurman act to the Kansas Pacific Railway Co. and to the Central Branch Union Pacific Railroad Co.; that, on failure to pay, a receiver shall be appointed.

It provides for the ascertainment of the present worth of the debt of the Central Pacific Railroad Co.; then for the payment of interest at the rate of two per cent. per annum, payable semi-annually, and of so much of the principal as shall result in the payment of the entire debt in 75 years. But in order to relieve the road from too great a burden during the next 10 years, when it is necessary for it to make somewhat extensive improvements, it capitalizes for that time one-half of the two per cent. to be paid.

It requires a mortgage of the entire property of the Central Pacific Railroad Co., including some very important roads in California; and also, by that section and a subsequent one, that the Southern Pacific Railroad Co. and the Central Pacific shall make the present lease subsisting between them additional security to the United States for the payment of the debt.

Either of said companies may extend the payment of or refund indebtedness prior to that of the United States to the extent of the par value of such first mortgage bonds, the rate of interest not to exceed five per cent.

In the event of any default for 90 days in the payment of interest or principal, as required by the act, the entire debt shall immediately mature.

The United States may retain all money due to these companies for services until the installments of principal and interest upon their bonds next maturing after such services are rendered shall be fully paid.

The companies shall pay no dividends unless the same shall have been actually earned, and unless they shall have paid all interest and matured indebtedness due, with a penalty for the violation of the act by any director or officer.

The Union Pacific people seem to be fairly well satisfied with the plan proposed; the Central Pacific decidedly less so.

The Massachusetts Commissioners' Report.

This differs from most other documents of its kind in devoting chief attention to details of operation. Concerning car heating the board says: "A general impression prevails that the use of stoves in passenger cars in Massachusetts has been prohibited. This impression is incorrect. The 'common stove' has been abolished by law, but all the other stoves approved by this board since the passage of the act of the year 1882, whether furnishing heat by direct radiation or by means of hot water or steam circulation, may still lawfully be used in passenger cars in this State. The responsibility of determining how cars shall be heated, which in 1887 was transferred by the Legislature to this board, was taken away from the Board by Chapter 103 of the Resolves of the year 1888. Following are the number of cars heated by steam on the following roads: Boston & Albany, 243; Boston & Maine, 232; Fitchburg, all; New York and New England, 158; Old Colony, 152; Connecticut River, 50; New London Northern, 16; Providence & Worcester, 40; Boston, Revere Beach & Lynn, (all) 25." The experience of another year has not changed the opinion of the board with regard to the expediency of heating by steam from the locomotive.

Ventilation and freight train brakes are briefly discussed. The report on bridges, by Professor Swain, is long and valuable. Special attention is called to the recommendation that jack-knife draws be guarded by re-railing devices.

Great danger exists at suburban stations where passengers may, and sometimes must, cross the tracks on a level. The Commissioners say: "The fact is, that our suburban business has outgrown our station arrangements. In the vicinity of Boston the stations are so close together and accommodation trains are so frequent, that it is not good railroading to continue conditions under which the occupation of one track at a station is a bar to the use of all the other tracks. In other words, the train service on the main lines in the vicinity of Boston has grown to such proportions that it cannot be conducted properly and with reasonable safety unless it has the exclusive use of the roadbed at stations."

From the returns made by the various companies, it appears that the whole number of highway grade crossings is 2,218, being 11 less than the number reported last year. Twenty-three petitions for grade crossings have been considered by the board during the year; of these, five were for crossings of private tracks for freight purposes. Thirteen grade crossings have been abolished. The abandonment of a portion of the Boston, Winthrop & Shore Railroad accounts for five of these. The remaining eight were distributed as follows: Three on the Boston & Albany, two on the Old Colony and three on the Fitchburg Railroad.

During the past year 11 were killed and 11 were injured at grade crossings protected by gates or flagmen, and 19 were killed and 15 were injured at unprotected grade crossings.

The remissness of some of the companies in not providing driving-wheel brakes, is strongly condemned.

No table of accidents is given in the advance sheets. The summary is badly arranged, different parts being summarized on different principles. The total number of casualties reported was 652 against 782 during the preceding year. Two hundred and thirty-six were fatal, and 416 not fatal. No passenger was killed from causes beyond his own control.

The mileage of companies reporting is 3,001; average cost per mile, \$75,801. A few of the leading figures of operation are as follows:

It appears that tonnage has diminished, but distance carried has decidedly increased. Rates have diminished slightly. Average train loads, both of freight and passengers, have largely increased.

	1887-8	1888-9.
Passenger earnings.....	\$27,368,000	\$28,154,000
" carried.....	89,636,000	93,520,000
" mileage.....	1,303,000,000	1,356,000,000
Freight earnings.....	\$26,351,000	\$27,064,000
Tons carried.....	25,787,000	25,482,000
Ton mileage.....	1,686,000,000	1,772,000,000
Train miles:		
Passenger.....	20,262,000	20,316,000
Freight.....	13,694,000	14,009,000
All trains.....	42,495,000	43,082,000

Railroad Bridges in Massachusetts.

Following are some extracts from that part of the annual report of the Railroad Commissioners of Massachusetts which refers particularly to bridges. The subject is treated at considerable length in the report of Prof. G. F. Swain, engineer to the Board. The Board endorses the recommendations made in the report. Special attention is called to the recommendation that jack-knife draws be guarded by re-railing devices.

The re-railing devices used on the Fitchburg Railroad, on some of the bridges west of Greenfield, have been known to work successfully in several cases. The superintendent of that division reports that there have been three or four cases in which cars have been re-railed by this device during the last year and a half. A case was cited of a derailed truck on a freight car which was re-railed at the Chickley River bridge. After crossing the bridge it became derailed again, and ran on the ties for a mile and a half to the next bridge, where it was re-railed and then remained on the track. The derailment in each case was caused by the brake beam, which finally

dropped off entirely, thus allowing the truck to remain on the track. What follows is from Prof. Swain's report:

In my last report I stated that the first reports of inspection had all been received and examined, and that most of the plans which you called for had also been received. I have now to state that, with the exception of those from one road, all of the plans have been received, examined and reported on. The one exception is the Boston & Albany. From this company complete plans of its bridges have not yet been received, and I have not yet reported to you regarding its structures. The reason for the delay is undoubtedly the fact that the company has for the past two years been busily engaged in extensively strengthening many of its bridges, and that at the time you requested plans it did not have suitable drawings showing these structures as they would be after such strengthening.*

The statute providing for the inspection of bridges required a report of inspection to be sent in by each railroad company at least once in two years, the first report to be submitted not later than Nov. 1, 1887. In accordance with this statute, a second report from the various railroad companies was required by law to be submitted not later than Nov. 1, 1889; and this report you requested from each of the companies several months ago. In accordance with this request, second reports have thus far been received from many of the roads.

The total number of railroad bridges in the state having a clear span of over 10 ft. is 1,673. The road having the largest number is the Boston & Maine, with 447. It is of course to be expected that as the bridges on a railroad approach the highest standard, and are made more durable and substantial, the expenditures for renewals and repairs will become smaller. It is, therefore, not surprising that the expenditures in 1889 are less than those in 1888. It will be noticed, however, that the total expenditure in 1889, on all roads together, is larger than in any previous year excepting 1888. The Providence & Worcester expended in 1889 almost double as much for repairs and renewals of bridges as in any previous year and more than double as much as in any previous year excepting 1888. The New York, New Haven & Hartford expended in 1889 nearly 20 per cent. more than in any previous year, and 40 per cent. more than in any previous year excepting 1888; the expenditures on this road, however, are of course mostly outside of the state of Massachusetts. The New London Northern expended in 1889 nearly three times as much as in any previous year, and over six times as much as in any previous year excepting 1888; it must be remarked, however, that a good deal of this expenditure was necessitated by the destruction of bridges by freshet. The Housatonic has expended less in 1889 than in any year included in the table, excepting 1886; while the Martha's Vineyard road has expended nearly double as much as in any previous year, owing largely to the fact that its bridges were damaged by storms during the winter.

Two hundred and eighty-eight bridges, or about 17 per cent. of the total number, have been rebuilt since July, 1887, while 164 others have been repaired or strengthened, making a total of nearly 27 per cent. Of the principal roads, the one showing the largest percentage of repairs and renewals is the Boston & Providence, nearly 60 per cent. of the bridges on this line having been either renewed or extensively strengthened, and all of its bridges being now in good condition. It will also be seen that the other portions of the Old Colony system have been much improved. The Providence & Worcester has done a great deal within the past year in bringing its bridges up to a high standard, and since July, 1887, nearly 40 per cent. of its bridges have been renewed or strengthened. It may here be mentioned that one of the new bridges on this road has been provided with a ballast roadbed, resting on a bed of asphalt concrete supported on an iron floor; this being the only example of this mode of construction in the State, and probably in New England.

Some of the roads have little to do in the future except to keep up current repairs, while on other roads there is a good deal still to be done before their bridges can be called satisfactory; and, much as has been accomplished during the past two years, I expect to see a continued improvement for several years to come.

With regard to bridge floors, some improvement has been made during the past year, and many of the roads now use a floor conforming to the recommendations of your board. There are some, however, which still use other forms—either with outside guard rails, no guard rails at all, or with ties too far apart.

With regard to the jack-knife draws, to which I referred in my last report, the Old Colony has already protected the one at Neponset with re-railing frogs, as recommended. The same company has also used re-railing frogs at each end of the Canton viaduct, which is a high and narrow structure and on a curve. I would again emphasize the extreme danger attending the use of jack-knife draws in localities where trains run over them at high speed, especially if entirely unprotected in case of derailment.

The Value of a Test Department.

The question of the value of a test department is being freely agitated. The Master Mechanics' Association has appointed a committee to report at its next meeting on the cost and management of such a department, and the question has been discussed editorially and otherwise in the *Railroad Gazette*.

A well-established system of testing and inspection of materials, is not antagonistic to the interest of the manufacturer. Of the economic and educational value of a test department there can be no doubt. On the Pennsylvania Railroad the difference in percentage of rejection between different makers of a certain class of material fell considerably in six years after the establishment of specifications. Especially is this true in railroad service where the conditions tend so much to excessive wear and tear of materials, and the work of renewal alone is therefore a heavy item of expense.

To make a test department a success, and to prevent it from becoming worse than useless, and a laughing stock for the manufacturer and the practical man, requires a broad mind, practical experience, scientific knowledge, sound reasoning and good judgment. One who is not able to appreciate thoroughly the mission which a test department has to perform will make a failure of it. To know when to be accurate, painstaking, deliberate, slow in decision, carefully weighing every evidence and comparing the results of chemical and physical research, or on the other hand to know when to decide quickly, on the basis of a few well-known

* Since this was written, complete plans have been received from the Boston & Albany Railroad Co. of all its bridges, excepting one on the Grand Junction branch.

facts and general principles without detriment to the interests of the company, requires a nicely balanced judgment and thorough knowledge of the qualities and properties of materials. Where these qualities are wanting, there will be everlasting doubt, hesitation, uncertainty, want of decision, and friction, which wears out the life of a railroad officer.

The fullest benefits will be derived from a test department when the practical and the theoretical and scientific knowledge are so nicely balanced that whenever the one tends to descend too much in the scale it is counterbalanced by the other.

To know what to test and how to test it is the criterion of usefulness of a test department and its value to a road; to sift the accumulated knowledge and experience and apply it properly and at the proper time; to diffuse part of this valuable knowledge and experience judiciously among those officers and employees who have to use the materials tested, is a feature which adds very much to the value of a test department. He who understands how to win and keep the confidence, good will and co-operation of the manufacturer, master mechanic and foreman for himself and the test department is master of the situation, and his department will be a potent factor in the financial success of a railroad.

The practical experience of those who are not college-bred should not be brushed aside contemptuously. Such experience is a very valuable auxiliary to a test department. A concern need not blame anybody if, for the sake of saving a couple of thousand dollars annually for a competent man, for more help or for better appliances, ten times that sum is lost through avoidable leakages. Whenever the business of a concern has grown to such proportions that several persons are employed, it may be found best to divide the physical department of a test department into what might be called mechanical and metallurgical sections. The one devotes its labors to the investigation of devices for the improvement of appliances, machinery, rolling stock, etc., and the other confines itself exclusively to the testing and inspection of metals.

The field to be covered is so large in each section that there is ample room for any amount of activity in each. These sections and those in charge of them should be entirely independent from one another. Each becomes necessarily a specialist in his branch, and all his abilities are taxed to do justice to the work to be done. Consequently, if one only is in charge, taste, inclination and circumstances will cause him to take more interest in one branch of the work than in the other, with the result that he loses sympathy with and thorough understanding of the needs of the other branch of work. One class of work therefore will suffer for want of attention. Routine work should be done by intelligent and reliable assistants, to leave time free for original research and the study of conditions and phenomena.

Summarizing the conditions necessary to make a test department valuable experience seems to suggest:

1. A division into chemical and physical departments, and the latter again into a mechanical and metallurgical section.
2. A classification of materials into their uses by groups in order to be able to decide what and how to test; what needs to be the best grade and what not.
3. A division into commercial and scientific testing. The one to serve the needs of everyday service, the other to accumulate accurate data for future use and guidance.
4. Conform specifications to the needs and circumstances of the service and processes of manufacture.
5. To secure the confidence of manufacturers and the co-operation of the officers.
6. To change the systems and specifications in time to suit altered conditions.—Paul Kreuzpointner in the Iron Age.

The Westinghouse Buffer.

The Union Switch & Signal Co. has brought out a new and improved form of the friction buffer which it has been developing. It is now known as the Westinghouse Double-Acting Friction Buffer. It has already been described in the *Railroad Gazette*, but is here shown in its last form.

Fig. 1 represents the buffer underneath a car showing the method of holding up the apparatus and the drawbar, together with the mode of attaching the truss rods to form a continuous drawbar. Fig. 2 is a plan, and fig. 3 a full section, showing the construction of the friction and wedging device.

The back of the drawbar bears against a strap A,

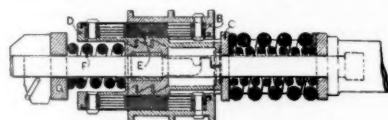


Fig. 3.

which is securely riveted to the outer case B holding the friction plates. Inside of this U shaped strap is a draft spring which bears against a washer C, which pushes the other case D containing the friction plates. These plates interlock, as clearly shown. The inner case D has inclined surfaces in the shape of rip-saw teeth, as shown at E. Inside of this case there is a bushing having teeth with a corresponding inclination and against which presses a small spring F, which at its opposite end bears against a follower plate G. Through the center of this device passes the tail bolt, secured at the rear end by a cotter. In Figs. 1, 2 and 3 the device is shown in its normal condition; that is, without either extension or compression. In 4, 5, 6 and 7 it is shown as in operation the first two figures pulling and the last two buffing.

Referring to fig. 4, it will be noticed that the draw head has been pulled out 1 in. and the follower plate G has been pulled away from the drawbar stops H, and the small spring F, fig. 3, compressed. As this spring bears against the wedge-shaped washer, as shown at E, fig. 3, this pressure causes the inner case D to be forced outward and the friction plates to be pressed against each other. In this condition they furnish a resistance as the result of their friction during the period while the

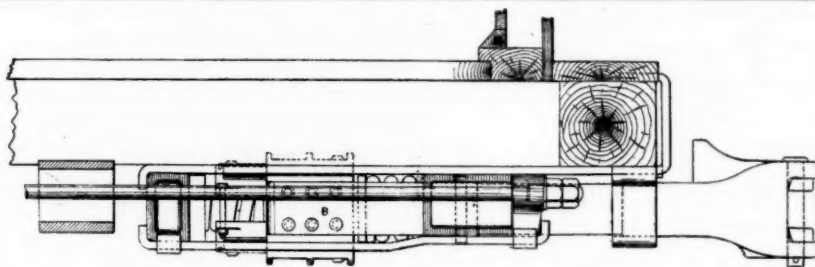


Fig. 1.

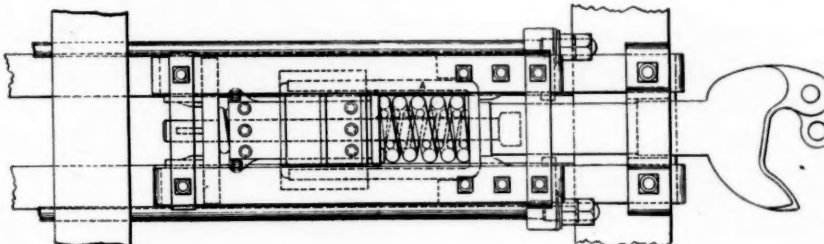


Fig. 2.

WESTINGHOUSE DOUBLE-ACTING FRICTION BUFFER.

draw head is being pulled out to $2\frac{3}{4}$ in., as shown in fig. 5. It will be noticed in this figure that the follower plate G has been pulled away a considerable distance from the draw bar stops H, and that the draft spring I is fully compressed. In fig. 6 the draw head has been pushed in

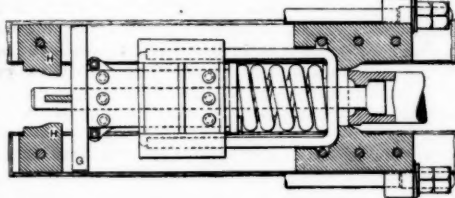


Fig. 4.

1 in. and the follower plate is against the drawbar stop. In this position, referring to fig. 3, it will be seen that the spring F is also compressed, and that the inclined surfaces at E have caused a pressure as before, which binds the friction plates together. Further compression from this position, as shown in fig. 7, compresses the draft spring and drives the friction plates in, thus producing the desired resistance. The movement inward, as well as outward, from a normal condition is $2\frac{3}{4}$ in. The details of construction are so clearly shown in the

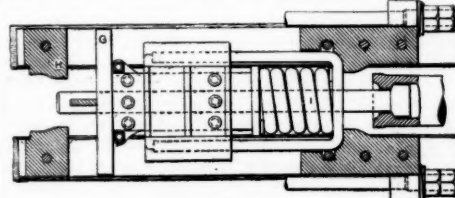


Fig. 5.

several illustrations that any further description is unnecessary.

For some time past the Union Switch & Signal Co. has been experimenting with various forms of this buffer, and as a result of these experiments the present form has been devised to meet the demands of service, which, as expressed in a circular by that company, are for a device designed as a component part of a draft gear whereby its capacity as a buffer for absorbing momentum without shock to the structure is greatly increased, and whereby the shock to rear cars of a train in pulling out is much diminished.

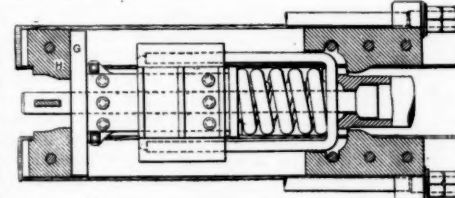


Fig. 6.

The capacity of this device as an average of several tests made in a laboratory is as follows:

Resistance due to initial spring	13,000 lbs.
" " friction	37,445 "
" " draft spring	18,000 "
Total resistance	68,445 lbs.
Work done in compressing friction buffer	8,388 ft. lbs.
Work done in compressing present ordinary draft spring, 6×8 in., $1\frac{1}{2}$ in. motion, and 18,000 lbs. capacity	1,314 "
Ratio of work done in compressing buffer to work done in compressing ordinary draft spring	$\frac{8388}{1314} = 6.46$

These resistances are very considerably increased when

the friction plates become dry in service, and, in many cases, resistances exceeding 100,000 lbs. have been developed.

Some of the advantages of the use of this coupler are based upon a belief by the manufacturers that the use of automatic couplers will lead to the switching of cars at a higher rate of speed than has heretofore been common, engineers having had regard for the brakemen, who have heretofore gone in between the cars; and the breakage that will result from the higher speed will be greatly in excess of the expectation of the advocates of automatic couplers.

In ordinary drawgear the action and reaction of the draft springs being equal, the breaking in two of trains is a common occurrence, due to the traction of the engine and the reaction of the springs. The friction buffer acts to offer resistance and retards the reaction.

In the ordinary operation of trains the dead blocks are brought together as frequently as the train is stretched or compressed. With the friction buffer these

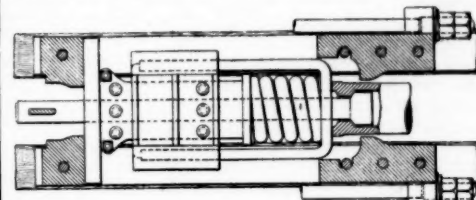


Fig. 7.

frequent shocks may be reduced, and in cases where the cars are run together with a force sufficient to about exhaust the power of this device the car framing, if the ordinary drawgear were used, would receive a severe shock.

The Master Car-Builders' standard coupler is being largely applied. With this form of coupler the dead blocks are inoperative in all cases where cars come together with hooks closed. In such cases the friction apparatus is operative, and this is one of the most advantageous features of its action. A train equipped with this device is now making a tour in the West, will be soon exhibited in the East, due notice of which will be given in these columns.

The Wreck of the Peoria & Pekin Bridge.

We have received from a very reliable source some particulars of the wreck on Feb. 3 of the Illinois River Bridge of the Peoria & Pekin Union Railway near Peoria. The north span gave way under an Ohio, Indiana & Western consolidation engine just starting out with a freight train, causing the death of three men. The engine had evidently just reached the pier across the span, when the bridge gave way under the rear drivers and the weight of the train forced the engine almost perpendicularly against the side of the pier, and pinned the men between the engine and tender in the water. It was impossible to release them until the engine was thrown over into the river. The span was a 125 ft. combination post truss, rebuilt in 1881 by Rust & Coolidge, of Chicago, and designed for a live load of 3,000 lbs. per foot. It was inspected by the Detroit Bridge & Iron Works in December, and the cause of its failure has not been determined. It fell exactly in line, and from the third or fourth panel from the broken end remained apparently good, and all the cars were pulled up the incline on the track, with only three injured. The weight of the engine was 52 tons, and of the tender, 30 tons. The cars following were loaded with corn, and would average, with their loads, about 35 tons each. Two and a half cars and the engine would fill the span. There was no movement of the pier

but the coping under one end post was broken when the bridge fell.

As soon as the wreck was cleared a pile bridge was put in place of the span, and on the 10th the remaining spans—four of 150 ft. and a draw of 300 ft.—were tested with consolidation engines and loads of about 200 tons to the span, with maximum deflections of two inches on two spans, and $1\frac{1}{2}$ in. on the others, with full recovery after removing the load. The tests were made by the consulting engineer of the State Board of Railroad and Warehouse Commissioners, who saw no reason to apprehend failure in any part of it.

The bridge carries from 40 to 60 trains a day, and since it was rebuilt, has given no signs of weakness. Trains were resumed after the tests.

The Poughkeepsie Bridge Route.

We show in this issue a reprint of the map issued by the traffic department of the Central New England & Western Railroad, showing the connections of the Poughkeepsie Bridge.

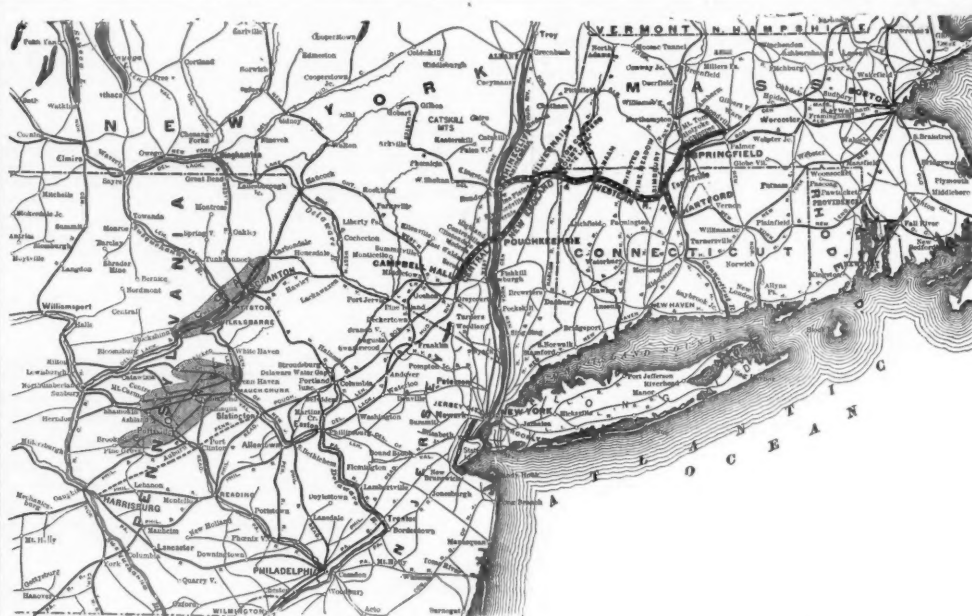
The Central New England & Western, as our readers know, is a consolidation of two or three smaller companies formerly owning portions of the line from Campbell Hall to Silvernails, N. Y. This road has all been built during the past two years, the owners of the bridge having failed to make satisfactory terms for the purchase of the existing New York & Massachusetts road from Poughkeepsie northeast, which is now paralleled. This constitutes the Central New England & Western proper; the remaining portion that is shown in heavy lines on the map, except that portion beyond Springfield, is the Hartford & Connecticut Western, which has been leased for one year. The control of this road is owned, and a long lease will doubtless be made at the expiration of the first year. It is proposed to build a branch to Springfield, Mass., as shown on the map. Much of the right of way for this branch has already been secured, and the plans, including those for the bridge across the Connecticut River to reach Springfield, are prepared. The proposed entrance to Springfield is on the north side of the city, and joins the tracks of the Connecticut River road, whose terminals would have to be used. From a point opposite Springfield, northward four miles to Chicopee and then eastward to Bondville, the Boston & Maine proposes to build, making a connection with its Central Massachusetts division.

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From the Scranton anthracite coal region to Campbell Hall the most direct line is controlled by the New York, Lake Erie & Western, which has an arrangement with the New York & New England to send coal eastward via Newburgh and therefore cannot be regarded as friendly to the new line. The distance from Scranton to Campbell Hall by the Erie is 120 miles; thence to Poughkeepsie it is 30 miles, making 150 miles to the Hudson River as against 128 to the river at Newburgh via the Erie. From Scranton to Campbell Hall, by way of the Delaware, Lackawanna & Western to Portland, and thence over the new Pennsylvania, Poughkeepsie & Boston, is 125 miles; from Manch Chunk to Campbell Hall, by the Central of New Jersey, via Easton, is 119 miles. The last-named company controls the Lehigh & Hudson River, and by leasing a portion of the Pennsylvania track, between Phillipsburg and Belvidere, runs trains through to Campbell Hall. The new line is about 27 miles longer than its shortest competing "all rail" route from the anthracite region, the distance from the Hudson River to Hartford being about the same by the New York & New England from Newburgh as by the new line from Poughkeepsie.

The Bridge line will get traffic, not because it offers cheaper routes, but because it is absolutely independent and neutral in its connections, and because it can take all rail coal into the region east of the Connecticut River and north of the Boston & Albany more advantageously than any existing lines. The first element, its neutrality, is considered very important and rates have been made, or will be made, with the Central of New Jersey, the Delaware, Lackawanna & Western, and the New York, Ontario & Western. The latter will probably be an important coal carrier when its new line to the coal fields is in operation.

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CENTRAL NEW ENGLAND & WESTERN RAILROAD AND CONNECTIONS.

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The New York & New England road from Newburgh to Hartford is both steep and crooked, but its disadvantage in this respect, as compared with the Hartford & Connecticut Western, which is not great, is more than offset by its access to valuable terminals in Hartford, Waterbury, Willimantic, Worcester, Springfield and other places further off. With all these facilities it has not succeeded in working up a very remarkable trade. The amount of coal eastward, via Newburgh, for the year 1889, was about 500,000 tons, equal to 100 fifteen-ton cars per day. This is about one-twentieth of the estimated total quantity of fuel going into New England annually. Good judges estimate that about six million tons of anthracite coal goes into New England by rail and water in a year, and that one million of this goes by rail. It thus appears that a considerable quantity must go by way of Albany, Troy, Mechanicsville and the Harlem River transfer.

It seems that while coal is actually worth from 25 cents to 75 cents a ton more when two handlings are avoided, it has been found very difficult for the railroads to reap any advantage from the fact. Retail dealers will sell anthracite for domestic consumption at higher rates when it comes all rail, but they will not pay higher rates of freight. Manufacturers recognize an increased value in the coal, and the certainty that coal may be bought all the year round, thereby obviating the necessity of accumulating a large stock before the close of navigation, is an advantage to them, but the advantage is not sufficiently marked to make it easy to work up a trade in opposition to the old established channels.

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We say that the New Haven road will by its concession secure additional traffic. If we assume that it might be possible to scare off the projectors of the new line, it may be argued that the coal business by way of Sound ports could be preserved and enlarged, and that therefore the bridge traffic cannot be counted as additional; but in view of the great advantage in cost of carrying still possessed by the water lines, the New Haven road may safely assume that its traffic from New Haven is not in danger. By liberal dealing with the new lines, it will derive the benefit of all their efforts to get traffic for themselves, and in the nature of things they will secure some business that no one else would get. As illustrating the cheapness of water transportation, one of the Sound boat owners recently said in an interview that he could send his barges to Newburgh, get the coal just where the New York & New England receives it, carry it down the Hudson, up the East River and through the Sound to Bridgeport, there load it on cars, and send it to Waterbury so cheaply as to successfully compete with the direct traffic of the New York & New England road from Newburgh to Waterbury.

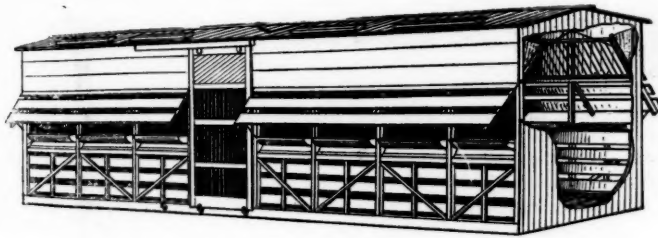
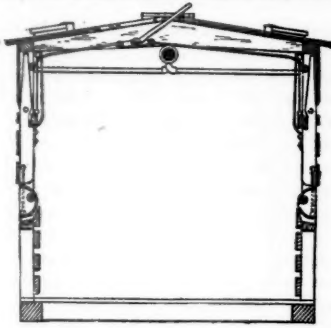
The Purchasing and Care of Supplies.

II.

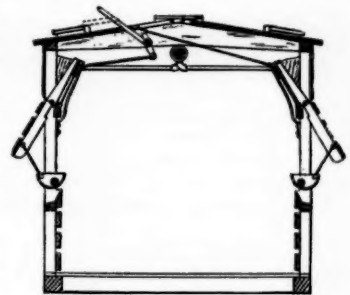
We will assume that a satisfactory organization has been effected for handling the supplies of a railroad company after the goods have passed into the hands of the proper officer, and that the articles bought have been found as desired and are upon the road ready for use. Let us next investigate to some extent the factors involved in handling and caring for such material up to the point of its use in actual service. With the multitudinous items which go to make up a railroad stock nearly as much difference in cost to the company may be made by the method in which such items are handled as in the methods used in the original purchase.

The material when ready for use will be held at one or more supply stations along the line of road, and the relative quantities held at the various classes of store centres will vary on different roads. In some cases the various shops and departments will hold stock nearly equal in amount, while again we may find the supplies grouped mainly at one or two centres the other points carrying only what is needed for daily consumption. There are certain reasons for following both systems, but as a rule the fewer stocks of material on the line that will supply fully the wants of the road the more efficient can the system be made. At any supply points all material of a certain class should only be carried by one department. For instance, we find in some cases that the shop's storehouse may carry certain sizes of lumber, while the building and bridge department may have a stock of exactly the same sizes, thus duplicating stocks and rendering the investment in material too large.

There are material changes which have taken place in the conditions of carrying stores during the last ten years, from a number of causes. The speeds at which freight trains are run are much higher than formerly, and there are so many improvements in the way of handling freights that much less time is taken in transit and the delivery of supplies than heretofore. Added to



IMPROVEMENTS IN THE BURTON STOCK CAR.



this is the fact that much larger stocks of the various materials used in railroad operation are now carried at a number of interior cities, so that supplies can be readily obtained without sending every time to the eastern manufactories. These two facts alone, together with the additional one that manufacturers are prompter in filling orders, reduce greatly the relative supply of material needed to be carried as compared with the issues of a month or a year.

In locating the storehouses of a company we not only have to consider the relation of the desired supply centre to the various parts of the road, but also the relation of the store buildings geographically to the other shop structures at the same point. The store should be so located that as little time as possible shall be lost in filling orders, and material should not have to be moved far from the supply place to the point in the shop at which it is needed. We have seen a number of cases when, through a faulty location or through the desire to use temporarily some existing buildings, the supply stocks were so unhandily placed that much time was lost by workmen coming with requisitions to be filled and by having to move the material long distances around the yards and shops.

The proper care of materials as against the weather or danger of leakage, shrinkage or theft is also important.

Nearly if not fully as important as the convenient location of the store building is its inside arrangement, which should be so designed that goods can be readily handled and easily inspected. The various racks, shelves and bins should be so arranged that the maximum of material can be handled with the minimum of labor, and so that there will be no chance of any class of material being in the way of handling any other. In designing iron racks, for instance, care should be taken, as one method of storing it may involve twice the labor that another does. With the question of interior arrangement comes that of orderly disposition of goods. When neatly piled, marked and priced they are much easier handled, and a little care in working off the articles longest on hand and broken packages will add much to the attractiveness of the stock. A well-arranged and well-cared-for storehouse may make a saving of the time of several laborers as compared with one in not so good shape. It is also expedient that the buildings be ample for the care of all classes of material which might suffer from exposure to the weather, improper protection in any way.

Assuming that our buildings are well located and properly arranged, we are in a position to handle our material stocks with the most efficiency as regards prompt delivery and the quantity of material carried. In our opinion, there is too often insufficient attention paid to this question of quantity of stock carried, and the tendency on the majority of roads is to carry by far too large an amount of material in the storehouses. The disadvantages of carrying too much material are manifold. There is, as we have already stated, a locking up of the company's capital and the chance of shrinkage and wastage and fire loss is large. There is also another factor of loss in that a large stock being more cumbersome occupies a greater space and is more expensive to handle relatively than a compact one well adapted to the company's needs. The danger of carrying too small an amount is not often met with, as any want of prompt response to the calls from the different departments is met by complaint, from those concerned.

Neither in order to show an apparently small amount of stores on hand should too much material be charged out to the various accounts before it is actually needed for use. This is apt to be done with some of the heavier items, such as wheels and lumber. This practice has the further disadvantage of increasing the operating expenses prematurely, and leaves more or less material at various points not covered by the material account, so that it will not be looked after as well or used as promptly as if it were still under the eye of the storekeeper. We remember one instance, when examining into the condition of supplies upon a road whose material account seemed small relatively to the yearly amounts expended, that nearly a hundred thousand dollars was charged out to car repairs in lumber in the shop and yards, much of which would not be used for months.

It is in this question of supply and demand that we find the advantage of having the stores run by a separate official. The average master mechanic, for instance, when acting as a storekeeper, does not well discriminate between quantity and character of supplies carried, and when efforts are made to reduce the value carried on

hand as material does not enough regard the fact that a comparatively small stock of goods of standard character, well adapted to the company's needs, is more valuable to him than twice the amount, consisting largely of old or unstandard articles.

In general terms, practice has shown that with the transportation facilities that now exist and the distribution of manufacturing centres and large wholesale establishments through the country, any road east of the Missouri River can operate with an average stock amounting to not more than a month's supply of miscellaneous materials. This statement we have often seen disputed; but on the other hand we have so often seen stores carried on this basis that we have no hesitation in saying that it can be applied to nearly every road in the territory referred to. It may be interesting, therefore, to examine into the relations between supply and demand on some of the various classes of railroad materials in order to determine what relative stock will have to be carried.

In the first place, it is absolutely necessary that there should be uniformity of standards not only in the general features of rolling stock and structures, but this should extend to the minor details of the service. The fact that one division of a road uses a little different pattern on its hand-car gearings from the next, or that the master builder on one part of the road differs from his neighbor in the sized lights of glass he uses in station or shop windows, are examples of things small in themselves, but which we have known to result in a material increase of stock carried beyond the proper amount. One road, belonging to a general system, has a little different drilling for an engine truck bed plate from its neighbor's pattern, though made from the same pattern number in casting. Here the difference, though small, prevents the parts from being interchangeable, and necessitates a larger stock to be carried on the whole system of such articles, fitted and ready for use, but yet the engines are supposed to be of one standard.

The lumber stock is one that is responsible for a large accumulation. The theory is a good one that for the majority of car and building lumber a period of seasoning is required; but this is too often an excuse for an overstock in various ways. In these times of change the endeavor to order lumber stocks far enough ahead to allow for the time needed in their manufacture, and after their receipt by the company for a period of a year's seasoning, may have the result at the end of that time of finding the road loaded up with a supply of unstandard material which has to be cut up or otherwise adapted to the changed conditions. Large stocks of car lumber, except for such simple things as 2-in. flooring or siding, should be laid in with great caution. An intelligent calculation and judicious purchase can run the average road on not over three or four months' supply of lumber and timber when we consider all varieties needed.

Wheels and axles form another stock in which there is generally too much money locked up. The ordinary car wheel is one of the easiest things to order and keep a supply of, being like the standard goods of sugar or flour to the average grocer. We find, nevertheless, that the supply deemed necessary upon roads in the same territory may vary from three-quarters of a month to a six months' stock. It will often be found that large numbers of wheels and axles may be held as stock for repairs at out-of-the-way places where really but few are needed and such stocks can be much reduced. Experience has shown us that upon any road having its own foundry or buying wheels at points on the line, the whole car and engine wheel stock should be turned over monthly, or even a little oftener, including certain patterns of engine wheels which might have to be carried a longer time before use.

Iron and brass castings are among the stores which are usually too large, yet they can be very closely carried if proper care is taken. These particular stocks are too often left to the whims of several foremen, each of whom has the part of ordering the replenishment of the portion of the stock which applies to his particular line, and an overstock is the consequence. We know whereof we speak when we say that at any large storehouse where the company makes its own iron and brass castings, or where they are made in the same towns with the principal shops, they can be turned over more than once a month; yet we have under such conditions seen even a year's supply carried. It is better to have some one man in charge of this particular class of stock who, while not knowing perhaps just when each piece is used on a car or engine as well as a foreman from the shop, will have

a great deal clearer idea of how many pieces of any particular casting are used monthly.

Bar and sheet iron and steel are articles which are apt to accumulate by mistakes in orders, overordering, and change of standards, yet by care in ordering and a fair amount of co-operation on the part of blacksmiths in using up unstandard sizes these stocks may be run very close upon a month's supply.

Engine and car springs, while not as easily handled as some other articles, especially when there are numerous standards upon the line, can with intelligent care be prevented from exceeding two months' supply. Engine, boiler and gas fittings are also hard stocks to handle, as some particular piece may have to be kept on hand for months before using; but there is sufficient material included in these classes that can be turned over more readily to bring the general average down to two months' supply.

Screws, files and miscellaneous hardware are always sources of grief to the ambitious storekeeper, as the numerous sizes needed with the whims of different foremen may largely overbalance the efforts of the best management. The adoption of standard sizes for all these small articles, care in ordering new supplies, and a judicious substitution of sizes upon requisitions, will, however, work even these stocks down so that we can travel on not over a two months' supply, taking good, bad and indifferent articles together.

Oils and waste are supplies that come with regularity, and with which the storekeeper can turn his supply over more than once a month, thus balancing some of the slower articles.

In short, eternal vigilance and the closest watch of each individual class of goods is necessary for the most efficient carrying of material; but in many cases a record may be made in the reduction of stock, and a ratio between supply and demand which will be as gratifying as unexpected, both to the storekeeper and the managed ment.

In the foregoing we have not touched upon fuel, rails or ties, as the conditions of the market and the needs of the road will prevent as regular working of stocks as may be reached with miscellaneous supplies. The questions of care in handling, storing and issuing apply, however, to such supplies as well as those we have detailed more explicitly, and such care will always result in savings to the road.

TO BE CONTINUED.

Improvement in the Burton Stock Car.

The improvement illustrated consists in opening out a portion of the sides of the car when the troughs are in position to receive water and closing them when the troughs are emptied and turned up out of the way. The arrangement is clearly shown. By means of the lever the sides are opened out as shown, and the troughs prepared to receive the water. When the animals are through drinking the lever is reversed, the sides are closed and the troughs dumped, thus leaving the car without obstruction on the outside and at the same time perfectly free inside to receive such freight as is carried in cars of this character. The cost of this car complete with the Westinghouse air brake is less than \$700. The Burton Stock Car Company has just built several of this pattern, and arrangements are now being made to construct a large number.

Canadian Coal Industry.

The importance of the coal industry in Cape Breton is shown in correspondence of the *Halifax Herald* from Sydney. The writer states that at the present time there are nine coal mines in operation in Cape Breton and two more are opening. In connection with these, directly and indirectly, from 4,000 to 5,000 persons are employed, and a population of about 18,000 has been settled in and about the various mining localities. About 2,550 vessels, with an aggregate tonnage of 450,000 tons, handle the coal shipment this year, with an employment of 24,000 hands. The quantity of coal mined in Cape Breton during the year just closed was 745,000 tons, as compared with 240,000 in 1879. North Sydney and Sydney shipped 400,000 in 1889, as compared with 140,000 tons in 1879. The increase since 1879 has been steady. Comparing the yearly exports since 1878, the result of the present tariff is, in the estimation of the correspondent, "most satisfactory."

New Bridge at Kansas City.

The work on the new bridge over the Missouri at Kansas City, by which it is said four railroads will enter the city, is said to be in such an advanced state, that the structure will be completed by August next. Piers 8 and 9 are done; No. 7 is well under way; stone is being laid on Nos. 5, 6, 2 and 1; the caisson for No. 4 is being put in and no work has been done on No. 3. The owners of the bridge propose to establish a new union passenger station.

but the coping under one end post was broken when the bridge fell.

As soon as the wreck was cleared a pile bridge was put in place of the span, and on the 10th the remaining spans—four of 150 ft. and a draw of 300 ft.—were tested with consolidation engines and loads of about 200 tons to the span, with maximum deflections of two inches on two spans, and $1\frac{1}{2}$ in. on the others, with full recovery after removing the load. The tests were made by the consulting engineer of the State Board of Railroad and Warehouse Commissioners, who saw no reason to apprehend failure in any part of it.

The bridge carries from 40 to 60 trains a day, and since it was rebuilt, has given no signs of weakness. Trains were resumed after the tests.

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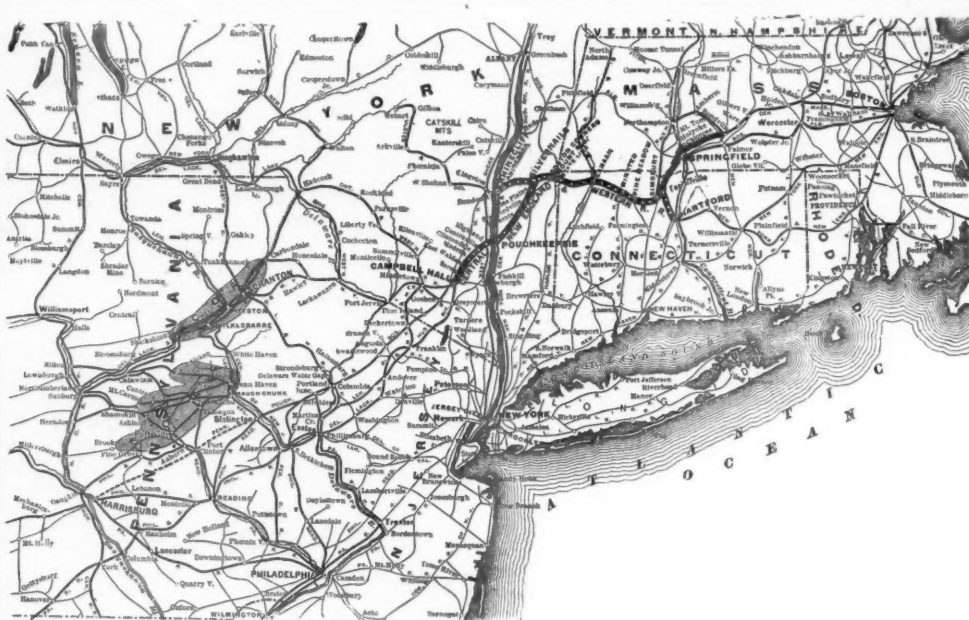
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As has been briefly noted in our news columns, the New York, New Haven & Hartford has afforded the Boston & Maine and the Central New England & Western a link by which they can do through business. The New Haven road has hitherto refused to make concessions, on the ground that it would thereby injure its own business from Long Island Sound to the interior of New England, but it is understood that now a rate has been made from Simsbury to Northampton, which will enable the two last-named roads to make reasonable through rates from west of the Hudson to points on the Boston & Maine. This is a sensible move and in accordance with true public policy. The bridge people propose to build a branch to Springfield, and the Boston & Maine proposes to build a line thence to a connection (at Bondville) with its line from Northampton to Boston. These two branches would aggregate about 34 miles, and the line they would take is through a territory which is not in need of new railroads. To get the local traffic of the city of Springfield the additional expense of a bridge across the Connecticut would be necessary, as the connection just spoken of would have to be made west of that river, the Boston & Maine's line being laid out to cross the Connecticut several miles north of Springfield. The line built several years ago to afford Springfield a competing line to the Sound already brings coal to that city, "all rail," via the Newburgh transfer barges, but it is doubtful if the road pays the interest on its cost. Under these circumstances the New York, New Haven

& Hartford has taken action which may prevent the expenditure of several hundred thousand dollars in unnecessary railroads and bridges, while at the same time it acquires a little additional traffic. The route from Simsbury to Bondville via Northampton is 50 miles long as compared with the 34 miles of the proposed new branches, but the interest on the million dollars, more or less, that would be spent for the new road will run a good many freight trains annually over the 16 miles additional.

We say that the New Haven road will by its concession secure additional traffic. If we assume that it might be possible to scare off the projectors of the new line, it may be argued that the coal business by way of Sound ports could be preserved and enlarged, and that therefore the bridge traffic cannot be counted as additional; but in view of the great advantage in cost of carrying still possessed by the water lines, the New Haven road may safely assume that its traffic from New Haven is not in danger. By liberal dealing with the new lines, it will derive the benefit of all their efforts to get traffic for themselves, and in the nature of things they will secure some business that no one else would get. As illustrating the cheapness of water transportation, one of the Sound boat owners recently said in an interview that he could send his barges to Newburgh, get the coal just where the New York & New England receives it, carry it down the Hudson, up the East River and through the Sound to Bridgeport, there load it on cars, and send it to Waterbury so cheaply as to successfully compete with the direct traffic of the New York & New England road from Newburgh to Waterbury.

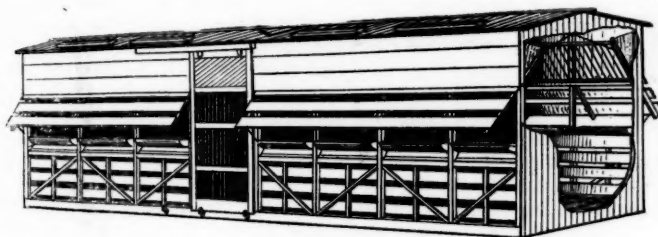
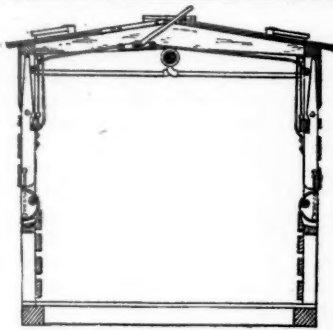
The Purchasing and Care of Supplies.

II.

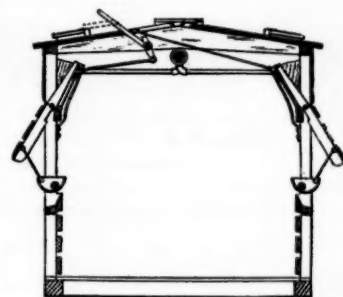
We will assume that a satisfactory organization has been effected for handling the supplies of a railroad company after the goods have passed into the hands of the proper officer, and that the articles bought have been found as desired and are upon the road ready for use. Let us next investigate to some extent the factors involved in handling and caring for such material up to the point of its use in actual service. With the multitudinous items which go to make up a railroad stock nearly as much difference in cost to the company may be made by the method in which such items are handled as in the methods used in the original purchase.

The material when ready for use will be held at one or more supply stations along the line of road, and the relative quantities held at the various classes of store centres will vary on different roads. In some cases the various shops and departments will hold stock nearly equal in amount, while again we may find the supplies grouped mainly at one or two centres the other points carrying only what is needed for daily consumption. There are certain reasons for following both systems, but as a rule the fewer stocks of material on the line that will supply fully the wants of the road the more efficient can the system be made. At any supply points all material of a certain class should only be carried by one department. For instance, we find in some cases that the shop's storehouse may carry certain sizes of lumber, while the building and bridge department may have a stock of exactly the same sizes, thus duplicating stocks and rendering the investment in material too large.

There are material changes which have taken place in the conditions of carrying stores during the last ten years, from a number of causes. The speeds at which freight trains are run are much higher than formerly, and there are so many improvements in the way of handling freights that much less time is taken in transit and the delivery of supplies than heretofore. Added to



IMPROVEMENTS IN THE BURTON STOCK CAR.



this is the fact that much larger stocks of the various materials used in railroad operation are now carried at a number of interior cities, so that supplies can be readily obtained without sending every time to the eastern manufactories. These two facts alone, together with the additional one that manufacturers are prompter in filling orders, reduce greatly the relative supply of material needed to be carried as compared with the issues of a month or a year.

In locating the storehouses of a company we not only have to consider the relation of the desired supply centre to the various parts of the road, but also the relation of the store buildings geographically to the other shop structures at the same point. The store should be so located that as little time as possible shall be lost in filling orders, and material should not have to be moved far from the supply place to the point in the shop at which it is needed. We have seen a number of cases when, through a faulty location or through the desire to use temporarily some existing buildings, the supply stocks were so unhandily placed that much time was lost by workmen coming with requisitions to be filled and by having to move the material long distances around the yards and shops.

The proper care of materials as against the weather or danger of leakage, shrinkage or theft is also important.

Nearly if not fully as important as the convenient location of the store building is its inside arrangement, which should be so designed that goods can be readily handled and easily inspected. The various racks, shelves and bins should be so arranged that the maximum of material can be handled with the minimum of labor, and so that there will be no chance of any class of material being in the way of handling any other. In designing iron racks, for instance, care should be taken, as one method of storing it may involve twice the labor that another does. With the question of interior arrangement comes that of orderly disposition of goods. When neatly piled, marked and priced they are much easier handled, and a little care in working off the articles longest on hand and broken packages will add much to the attractiveness of the stock. A well-arranged and well-cared-for storehouse may make a saving of the time of several laborers as compared with one in not so good shape. It is also expedient that the buildings be ample for the care of all classes of material which might suffer from exposure to the weather, improper protection in any way.

Assuming that our buildings are well located and properly arranged, we are in a position to handle our material stocks with the most efficiency as regards prompt delivery and the quantity of material carried. In our opinion, there is too often insufficient attention paid to this question of quantity of stock carried, and the tendency on the majority of roads is to carry by far too large an amount of material in the storehouses. The disadvantages of carrying too much material are manifold. There is, as we have already stated, a locking up of the company's capital and the chance of shrinkage and wastage and fire loss is large. There is also another factor of loss in that a large stock being more cumbersome occupies a greater space and is more expensive to handle relatively than a compact one well adapted to the company's needs. The danger of carrying too small an amount is not often met with, as any want of prompt response to the calls from the different departments is met by complaint, from those concerned.

Neither in order to show an apparently small amount of stores on hand should too much material be charged out to the various accounts before it is actually needed for use. This is apt to be done with some of the heavier items, such as wheels and lumber. This practice has the further disadvantage of increasing the operating expenses prematurely, and leaves more or less material at various points not covered by the material account, so that it will not be looked after as well or used as promptly as if it were still under the eye of the storekeeper. We remember one instance, when examining into the condition of supplies upon a road whose material account seemed small relatively to the yearly amounts expended, that nearly a hundred thousand dollars was charged out to car repairs in lumber in the shop and yards, much of which would not be used for months.

It is in this question of supply and demand that we find the advantage of having the stores run by a separate official. The average master mechanic, for instance, when acting as a storekeeper, does not well discriminate between quantity and character of supplies carried, and when efforts are made to reduce the value carried on

hand as material does not enough regard the fact that a comparatively small stock of goods of standard character, well adapted to the company's needs, is more valuable to him than twice the amount, consisting largely of old or unstandard articles.

In general terms, practice has shown that with the transportation facilities that now exist and the distribution of manufacturing centres and large wholesale establishments through the country, any road east of the Missouri River can operate with an average stock amounting to not more than a month's supply of miscellaneous materials. This statement we have often seen disputed; but on the other hand we have so often seen stores carried on this basis that we have no hesitation in saying that it can be applied to nearly every road in the territory referred to. It may be interesting, therefore, to examine into the relations between supply and demand on some of the various classes of railroad materials in order to determine what relative stock will have to be carried.

In the first place, it is absolutely necessary that there should be uniformity of standards not only in the general features of rolling stock and structures, but this should extend to the minor details of the service. The fact that one division of a road uses a little different pattern on its hand-car gearings from the next, or that the master builder on one part of the road differs from his neighbor in the sized lights of glass he uses in station or shop windows, are examples of things small in themselves, but which we have known to result in a material increase of stock carried beyond the proper amount. One road, belonging to a general system, has a little different drilling for an engine truck bed plate from its neighbor's pattern, though made from the same pattern number in casting. Here the difference, though small, prevents the parts from being interchangeable, and necessitates a larger stock to be carried on the whole system of such articles, fitted and ready for use, but yet the engines are supposed to be of one standard.

The lumber stock is one that is responsible for a large accumulation. The theory is a good one that for the majority of car and building lumber a period of seasoning is required; but this is too often an excuse for an overstock in various ways. In these times of change the endeavor to order lumber stocks far enough ahead to allow for the time needed in their manufacture, and after their receipt by the company for a period of a year's seasoning, may have the result at the end of that time of finding the road loaded up with a supply of unstandard material which has to be cut up or otherwise adapted to the changed conditions. Large stocks of car lumber, except for such simple things as 2-in. flooring or siding, should be laid in with great caution. An intelligent calculation and judicious purchase can run the average road on not over three or four months' supply of lumber and timber when we consider all varieties needed.

Wheels and axles form another stock in which there is generally too much money locked up. The ordinary car wheel is one of the easiest things to order and keep a supply of, being like the standard goods of sugar or flour to the average grocer. We find, nevertheless, that the supply deemed necessary upon roads in the same territory may vary from three-quarters of a month to a six months' stock. It will often be found that large numbers of wheels and axles may be held as stock for repairs at out-of-the-way places where really but few are needed and such stocks can be much reduced. Experience has shown us that upon any road having its own foundry or buying wheels at points on the line, the whole car and engine wheel stock should be turned over monthly, or even a little oftener, including certain patterns of engine wheels which might have to be carried a longer time before use.

Iron and brass castings are among the stores which are usually too large, yet they can be very closely carried if proper care is taken. These particular stocks are too often left to the whims of several foremen, each of whom has the part of ordering the replenishment of the portion of the stock which applies to his particular line, and an overstock is the consequence. We know whereof we speak when we say that at any large storehouse where the company makes its own iron and brass castings, or where they are made in the same towns with the principal shops, they can be turned over more than once a month; yet we have under such conditions seen even a year's supply carried. It is better to have some one man in charge of this particular class of stock who, while not knowing perhaps just when each piece is used on a car or engine as well as a foreman from the shop, will have

a great deal clearer idea of how many pieces of any particular casting are used monthly.

Bar and sheet iron and steel are articles which are apt to accumulate by mistakes in orders, overordering, and change of standards, yet by care in ordering and a fair amount of co-operation on the part of blacksmiths in using up unstandard sizes these stocks may be run very close upon a month's supply.

Engine and car springs, while not as easily handled as some other articles, especially when there are numerous standards upon the line, can with intelligent care be prevented from exceeding two months' supply. Engine, boiler and gas fittings are also hard stocks to handle, as some particular piece may have to be kept on hand for months before using; but there is sufficient material included in these classes that can be turned over more readily to bring the general average down to two months' supply.

Screws, files and miscellaneous hardware are always sources of grief to the ambitious storekeeper, as the numerous sizes needed with the whims of different foremen may largely overbalance the efforts of the best management. The adoption of standard sizes for all these small articles, care in ordering new supplies, and a judicious substitution of sizes upon requisitions, will, however, work even these stocks down so that we can travel on not over a two months' supply, taking good, bad and indifferent articles together.

Oils and waste are supplies that come with regularity, and with which the storekeeper can turn his supply over more than once a month, thus balancing some of the slower articles.

In short, eternal vigilance and the closest watch of each individual class of goods is necessary for the most efficient carrying of material; but in many cases a record may be made in the reduction of stock, and a ratio between supply and demand which will be as gratifying as unexpected, both to the storekeeper and the managed ment.

In the foregoing we have not touched upon fuel, rails or ties, as the conditions of the market and the needs of the road will prevent as regular working of stocks as may be reached with miscellaneous supplies. The questions of care in handling, storing and issuing apply, however, to such supplies as well as those we have detailed more explicitly, and such care will always result in savings to the road.

TO BE CONTINUED.

Improvement in the Burton Stock Car.

The improvement illustrated consists in opening out a portion of the sides of the car when the troughs are in position to receive water and closing them when the troughs are emptied and turned up out of the way. The arrangement is clearly shown. By means of the lever the sides are opened out as shown, and the troughs prepared to receive the water. When the animals are through drinking the lever is reversed, the sides are closed and the troughs dumped, thus leaving the car without obstruction on the outside and at the same time perfectly free inside to receive such freight as is carried in cars of this character. The cost of this car complete with the Westinghouse air brake is less than \$700. The Burton Stock Car Company has just built several of this pattern, and arrangements are now being made to construct a large number.

Canadian Coal Industry.

The importance of the coal industry in Cape Breton is shown in correspondence of the *Halifax Herald* from Sydney. The writer states that at the present time there are nine coal mines in operation in Cape Breton and two more are opening. In connection with these, directly and indirectly, from 4,000 to 5,000 persons are employed, and a population of about 18,000 has been settled in and about the various mining localities. About 2,550 vessels, with an aggregate tonnage of 450,000 tons, handle the coal shipment this year, with an employment of 24,000 hands. The quantity of coal mined in Cape Breton during the year just closed was 745,000 tons, as compared with 240,000 in 1879. North Sydney and Sydney shipped 400,000 in 1889, as compared with 140,000 tons in 1879. The increase since 1879 has been steady. Comparing the yearly exports since 1878, the result of the present tariff is, in the estimation of the correspondent, "most satisfactory."

New Bridge at Kansas City.

The work on the new bridge over the Missouri at Kansas City, by which it is said four railroads will enter the city, is said to be in such an advanced state, that the structure will be completed by August next. Piers 8 and 9 are done; No. 7 is well under way; stone is being laid on Nos. 5, 6, 2 and 1; the caisson for No. 4 is being put in and no work has been done on No. 3. The owners of the bridge propose to establish a new union passenger station.



Published Every Friday.
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The New York Court of Appeals, as appears from the 18th decision in our Railroad Law column this week, has set up a pretty strict rule for the guidance of railroads in handling foreign cars. It is, in effect, that when a car with an unusually high or unusually low drawbar is received from a connecting line, the company is bound to notify the brakemen before asking them to handle such a car. The court apparently deems it proper to require the car inspector to do this. While the general tendency of this decision may not be wrong, we must confess that it seems very narrow. Railroads need spurring up to a higher degree of carefulness in this department of work, but no practical man would have issued such a decision as this. If the judges had stopped to consider that many roads have in their own equipment drawbars of very various heights, they would have seen the absurdity of establishing such a rule as this for general application. Theoretically it is right that the car inspector shall inform brakemen of peculiarities of cars, but when those peculiarities are a matter of the most common knowledge, and are forced upon the attention of the brakemen themselves constantly, probably many times every day, to assume that the brakeman needs to be told of the danger in handling couplers of unequal height, is to assume that he is a blockhead.

The United States Court in Minnesota, as noted in the 17th decision, establishes another rule on a similar subject, which is more business-like. It is, in effect, that the railroad must not only issue proper precautions to its men, but that it must know that the circular giving those cautions has been received and understood by the man for whom it is intended. This would seem to be self-evident to every one, but possibly we must except railroad superintendents. The 19th decision (by a Minnesota State Court) is also instructive.

The settlement of the immigrant ticket troubles by the entire abandonment of outside agencies gives great cause for satisfaction. Of late the Lackawanna has been the only line which opposed this reform. The grounds on which it based its action have not been made very clear. Its representatives have admitted that the direct gain from its course was at best very trifling; and they have claimed that they were enabled, by their outside agencies, to maintain advantageous relations with their Western connections. If it required the intervention of outside agents to secure these advantages, the presumption was that they were of an unfair, not to say underhand, character; and it was likely that the agents themselves got much more of the advantage than the railroad did. If an irresponsible agent had it in his power to distribute traffic among Western roads, those roads had a strong temptation to offer him personal inducements for favoring them. The Lackawanna obviously did not care to have the matter investigated. As long as the trunk lines were at all irresolute, it stoutly refused to do anything,

perhaps thinking that the whole management of the immigrant business by the trunk lines was so nearly a violation of the law against pools that they would not care to have public attention drawn to the matter. But when it became evident that the other lines were fully in earnest, and were prepared to exclude the Lackawanna wholly from the association, unless it would submit to arbitration in this matter, the whole case settled itself. There was really nothing to arbitrate, so completely had the Lackawanna been playing a bluff game. When a call was inevitable, it did not care to go through with the formality of showing its hand. If you have been backing a knave against four kings, it is not necessary to ask Mr. Samuel Spencer to decide which is the better hand.

The proposed settlement of the Pacific Railroad debts is a sensible one. If accepted, it will prove a gain to both parties. The government would gain by the increased security. The present mortgage is wholly inadequate to meet the indebtedness of either road. It covers only a part of the lines; in the case of the Central Pacific, a very unproductive part. The proposed plan includes many branches and connecting lines under the new mortgages, and gives the government rights of action against whole systems instead of isolated portions. The gain to the railroads is no less conspicuous. While a foreclosure under present circumstances would not protect the government, it would ruin the investors in the companies. If, on the other hand, the Union Pacific is allowed to postpone payment of its indebtedness at three per cent. annual interest, the investors are at least partially protected, and the government gets more money than it would by undertaking to foreclose. We dislike the statement that the government gets the full value of the debt. Interest at three per cent. on this kind of security is not full value. But we think that the government obtains all it can, and that by claiming more it would actually get less. The main thing is to get all we can, rather than to insist on all we think we ought to have. The Central Pacific interest is fixed at two per cent. instead of three. Two per cent. on the debt of the lines covered by the Central Pacific mortgage would undoubtedly be a heavier burden than three per cent. on the Union Pacific. The railroad authorities seem doubtful whether they can pay it. But we think they will. Although the Southern Pacific Company may not be making much out of the Central Pacific just now, it cannot afford to have that particular line across the Sierra Nevada go out of its hands. What the Central Pacific makes now is no measure of what it might make if allied to the Union Pacific instead of to the Southern Pacific; still less is it a measure of what the Southern Pacific would lose by a change of that kind. Rather than face such a contingency we have not the slightest doubt that the Southern Pacific managers would accept the terms proposed by the present bill.

Guarantee of Chilled Wheels.

We are glad to see the question of service guarantee of chilled wheels taken up by the technical clubs. It was discussed at some length at the last meeting of the New England Club, and a report of the discussion appeared in our issue of Feb. 14.

The form of guarantee adopted last summer by the Master Car-Builders' Association was not criticised by any of the speakers, and there was no suggestion of the reason why it has not been put into use by the railroads in buying, except that "the purchasing agent wants to have his way in purchases, and he stands right in the path of the adoption of such a plan." Perhaps so, but surely he can be induced to get out of the path. Probably one obstacle is the increased complexity of the method of accounting. This will be considerable, but, on the other hand the form of guarantee promises to greatly increase the service of wheels, particularly of those under freight cars, and to bring about a very considerable economy. Any increase in cost of book-keeping would probably be repaid many times over by the greater efficiency of the wheels bought. The great object of the form of guarantee, as finally submitted to the M. C. B. Association by its committee, and as adopted, is "to offer to wheelmakers a substantial inducement to make the most durable wheel possible, and to share with the maker the profit arising," from the fact that the wheel gives long service.

The reader will remember that the method of purchase and settlement is this: The buyer agrees to pay a certain price per wheel, say \$8 or \$10. He agrees to credit the seller with a certain sum per 1,000 miles run by the wheel if under passenger cars or engines, and per month if in freight car service. He debits the seller with 55 per cent. of the price of the wheel. Un-

der this plan the cost per mile of wheel service decreases as the life of the wheel increases, and as the original fixed sum paid is spread over more and more miles. On the other hand, the maker has an interest in the wheel as long as it lasts, and it continues to earn him money until it is withdrawn from service.

Here may come in another objection to the new form of guarantee. Under the customary form, when a wheel has reached its guaranteed life the maker has no more to do with it, and every mile that it makes is clear gain to the buyer; so it happens that under the new form of guarantee a wheel may cost a railroad company more than under the old form. For instance, the Master Car Builders' Committee finds the cost per 1,000 miles of a \$10 wheel, with a mileage credit of 10 cents per 1,000 miles, after running 80,000 miles, to be 15.62 cents. If the wheel had been bought for \$10 outright, and run 80,000 miles, it would have cost 12.50 cents per 1,000 miles of service. But if the wheel ran only 50,000 miles it would have cost 19 cents per 1,000 miles under the new form of guarantee and 20 cents under the old, provided the guarantee was for 50,000 miles, and the full price was paid.

What is aimed at in the form of guarantee adopted by the Master Car Builders' Association last summer is to fix a method by which the wheel-makers shall get paid for the service actually rendered by their wheels. If the railroad companies can, by severe inspection and tests, get wheels under the old method which will give considerable service over the guarantee, they get something that they don't pay for. Now, in the long run they cannot do this. It is common sense that an article made and consumed in great quantities and bought and sold under free competition in the open market will always fetch a price pretty near its actual value. In the long run the consumer will get what he pays for—no more or less. Car wheels are a great staple, and the buyer cannot expect to get them below the market price except by accident; and with common prudence he need not pay more than the market price. It follows that if the new form of guarantee is adopted by the railroads in buying, prices, rates of mileage settlement and service guarantee will adjust themselves to actual values. The difference will be, however, that the wheelmaker will have a constant incentive to sell just as good a wheel as he can for the money got, and not, as now, to sell the poorest wheel he can get paid for. As a result the life of wheels will steadily increase, and the dead waste involved in changing and refitting wheels, in loss of service of cars and in accidents will steadily diminish. Every one knows that a wheel that runs 100,000 miles is worth more than twice as much as one that runs 50,000 miles, simply because with the latter wheel the unproductive expenditure is proportionately greater. It is in reducing to a minimum that part of the cost of a car wheel which represents neither profit to the maker nor metal to be worn out by the user, that the new form of guarantee promises to work to the advantage of both parties. In this its success must be found.

A Moral from the Memphis Bridge.

On another page will be found some particulars of the bridge now building over the Mississippi River at Memphis, Tenn. Much interest attaches to this bridge from its geographical position, and its stupendous proportions make it in an engineering sense one of the most important bridges ever undertaken. Aside from these considerations, however, its construction has brought forward again two great questions of public policy; these are the questions of the rights of those who bridge navigable streams, and of the medium through which the national government shall exercise its surveillance over those rights.

The bridge charter requires a clearance of 75 ft. above high water. The company asks that this may be reduced to 65 ft., and has prepared a draft of a bill in Congress amending the act of 1888, which authorized the construction of the bridge. The amendment would simply reduce the required height from 75 ft. to 65. The reasons for asking this reduction are, aside from the question of cost: First—The additional 10 ft. of height will necessitate raising everything carried over the bridge just so much higher than is necessary, and will be a tax on traffic over the bridge for all time. Second—The grade of the bridge will be brought about 10 ft. above the level of the bluff on which the city of Memphis stands. Existing street lines and grades must consequently be changed, and the bridge must be approached by a grade in the city, up which engines must be worked under full steam pressure, increasing the cost of working, and the dirt, noise and danger of fires.

There appears to be no good reason for the tax

upon commerce which will be imposed by the additional 10 ft. The clearance which the company asks to be allowed to provide is 12 ft. greater than that required on the Ohio. The bridges on the lower Ohio were built under the act of 1883, which provides for "a clear height of 53 ft. above local highest water." The Cairo bridge, four miles from the mouth of the Ohio, was built to this clearance and all boats passing out of the Ohio must go under it. The St. Louis bridges are built to give a clear height of 50 ft. above the height of the St. Louis city directrix, which gives actually but 42.4 ft. above the extreme high water of 1844. Therefore, 65 ft. gives ample clearance for boats coming out of these rivers.

It also provides for all existing boats plying on the lower Mississippi. It is obvious that it has not been the theory of Congress, or of the War Department, to give sufficient height to clear the smoke stacks, at all stages of the river, even with 75 ft. Of all the lower Mississippi River boats, there is none with a pilot house 65 feet high, even including 5 ft. of useless ornament; but there are 11 with stacks over 75 ft. high without ornaments, and the extreme height is 91 ft. 2 in., including the ornament. The highest pilot house is 59 ft. 9 in. without its ornament and 64 ft. 9 in. with it. It appears, therefore, that 75 ft. head room is 15 ft. more than is needed for the highest pilot house, and 16 ft. less than is needed for the tallest stack. The logic of the matter is not altogether clear. Why either one or the other existing fact was not taken as the determining element probably no one really knows. The report on the Memphis bridge, made by a board of engineer officers appointed in 1888, did not consider the question of height. It is quite possible, however, that a height was assumed that would clear all smoke stacks in ordinary stages of the river. Even on this assumption the tallest stack would need to be lowered when the river rose to within 16 ft. of extreme high water; that is, 18 ft. above assumed low water. The largest boats must be prepared to turn down their stacks, if they are to run during the higher stages of the river, even with the clearance now prescribed. Of course, the reader need not be told that this is ordinarily done by the larger boats running on the Ohio now.

The board mentioned above did not go into the question of height, but left it at 75 ft., as it stood in the charter. The same board recommended, in a majority report signed by two of its members, that the east span should be 1,000 ft. in the clear. This was to provide for coal tows 900 ft. long, coming down broadside on. The fourth member of the board, Col. Merrill, recommended a span 700 ft. in the clear with one pier on the eastern shore. He reasoned that no tow would come down broadside on unless the tow boat was disabled, and in this case the tow would be more likely to strike the shore or a pier than to pass through the 1,000-ft. channel. It seemed unjust to impose upon the land transportation interest the greater burden of a 1,000-ft. span to provide for the extremely remote chance of a tow becoming disabled just above it and drifting safely down through it, broadside on. The Secretary of War, Mr. Endicott, disapproved the majority report, so far as the length of span was concerned. He said: "While the rights of navigation in navigable rivers are to be jealously guarded and protected, the right to cross such streams by bridges to transport freight and passengers cannot be disregarded. There must be mutual concession; . . . to require such extreme length of bridge on the one hand as would permit navigation by tows in the same manner as if there were no bridge would be as unreasonable as to construct the bridge in such a manner as practically to destroy all transportation by tows." Fortunately, the larger views of public policy prevailed, and the company was permitted to make a span of not less than 700 ft. in the clear. In fact, it will be 770 ft. clear, and 791 ft. between piers.

Such are some of the facts in the case which bring up the question of the relative rights of commerce carried by navigable streams, and of that which crosses them. Since the fundamental theory of the law on this matter was established conditions have changed greatly. The relative importance of land and water carriers has been reversed in a large part of our country. River boats and canal boats have given way to railroads that could do the business of transportation quicker, cheaper and better. The process has been a natural evolution; business has simply gone where it was best served. The new method of transportation has grown up, taxed and hampered by old laws and customs, until now we see on all sides instances in which the commerce which crosses rivers is carried on at unnecessary cost and delay in order that it may not interfere with a hypothetical commerce which is not borne upon those rivers, but which may some time

again be carried by them. This is not precisely the case at Memphis. There is actually a large traffic up and down the Mississippi; but, as we have seen, the additional burden which will be placed upon the traffic crossing there can but little benefit that which is river borne.

The bearing of this case upon the question of the agency through which the government shall guard the rights of the nation in its navigable streams is pretty obvious. The reasons for which the majority of the board recommended a span of 1,000 ft. seem almost trivial in the face of the great increase in the cost of the bridge which the additional length of span called for. We are bound to think that a board of men who had come to a position of such responsibility after a life-long contact with commercial interests, in the course of the successful practice of an arduous profession, would have taken broader views of the relative places in public economy of the railroads and the rivers.

Still the judgment of the board was based on reasons that one can at least understand. This is not the case, however, with the height. Two years ago a board of engineers was appointed to consider a general bridge law, and after taking evidence as to height of steamers this board recommended a height of 70 ft. for bridges on this section of the river, and gave their reasons for requiring that height. These reasons were based on the heights of pilot houses in which, apparently by an oversight, the height of the ornament was included. The height of 5 ft. was subsequently added to this, no reasons having ever been given for the change. It would seem only just in the face of all this evidence that a reduction of the height to at most 70 ft. should be granted without question, or that a full statement of satisfactory reasons for refusing to make any reduction should be given and made public.

The attitude taken lately by the Chief of Engineers in the matter of the reduction of the required height of the bridge also has an important bearing on what we have said. The action of the government would naturally and properly, under the existing organization, be determined by the Engineer Bureau of the War Department, and, by the request of the Secretary of War, officers of the bridge company called on the Chief of Engineers to lay the facts and arguments before him. They were told that the Chief of Engineers gave no hearings, that all statements and arguments must be submitted in writing, and further, that the mind of the Chief of Engineers was made up on facts already known, and any further discussion would be useless.

The sum of the matter is that an effort to establish a new trade route of national importance has been more or less hampered by the very men whose duty it is to consider public interests from the broadest and most impartial standpoint, and to guard and promote them. This is a familiar story, and it is such instances as this of the Memphis bridge that have given much of its strength to the movement to establish a national board of public works. The movement now drags pretty heavily, but probably it will be renewed again before very long, and it is to be hoped that it will have more active and united support from the civil engineers of the country than it has ever had before.

Seals and Loss Claims.

A correspondent presents in another column some considerations on a subject which enlists a great deal of earnest attention, but which seems to elude with great success the repeated attempts to place it on a rational basis to which all shall agree. The replies to Mr. Webster's inquiries doubtless afford as true an index of the state of affairs now as five years ago.

The practice of attaching the seals of the intermediate individual road to a through car which already has terminal seals intact is one which cannot be defended by any sound reasoning. Its only effect is to throw suspicion upon the road so attaching. Roads which work together cordially in systems do not do this. If we suppose, for example, a loaded car from Boston to St. Louis arriving at Albany with Boston seals perfect, the custom there is for both inspectors (Boston & Albany and New York Central) to note the condition and reading of the seals in their books, but when same are in good order in no case to break them or add anything to them. Provided the sealing methods are good, there is no trouble in locating a robbery. If both inspectors at Albany show records of Boston seals, and Buffalo reports one Syracuse seal, the New York Central must pay. To carry out this plan it is clear that Syracuse or Buffalo should not put on its seal unless car was open, as such intermediate sealing is evidence against the sealing road. This

works well because the relations between the roads in the Vanderbilt system are close. It only remains to establish the same friendly and common sense business relations between separate roads or separate systems. The instance mentioned by our correspondent of a car arriving at destination with St. Louis, Halstead and Albuquerque seals all on it is a practical absurdity, and spoils the very design of a seal, which is to show where any breaking took place.

About the payment of concealed losses there is more dispute. We recall some claim cases a year ago, where several carloads of tea from San Francisco to New York arrived with S. F. seals, but checked a number of packages short. The intermediate roads at first declined to prorate, but the Trunk Line was equally firm not to pay half, since it was sure of its checking. The Central Pacific was equally sure, and the loss was finally adjusted on basis of earnings. The disagreement of views on this matter results from two opposite theories. The argument in our correspondent's letter is based on the idea that, in the absence of evidence of loss, either the loader or the unloader has made a mistake, and that he should suffer for it. After he has paid a sufficient number of heavy bills he will reform and become perfect. Some claims are settled on this basis by the trunk lines, but we do not learn that there is an established rule adhered to, except perhaps in the case of one system. The whole business is subject to such varying influences that if one has a rule believed to be based on abstract right he constantly encounters difficulties in enforcing it. The principle held by the majority, and especially those roads which belong to the "Eastern, Middle and Southern States Claim Agents' Association," is as above noted. They generally settle on the basis of earnings, but yet do not establish a rigid and formal rule. The arguments for asking an intermediateline to join in the payment of a claim are of various degrees of force, and are advanced with a vigor corresponding to the magnitude of the claim. In the first place, seal records, as well as checking out records, may be erroneous. The terminal lines are constantly doing a large amount of checking, of which the intermediate roads get the benefit without any corresponding expense. Of course, the question whether the earnings are divided on a correct basis is involved here, but in the hands of the average claim agent this is only one of the indeterminate quantities put into the argument for the purpose of influencing an opponent in any claim where the amount at issue is large; the intermediate road would not get the business but for the terminal lines; you may check the freight yourself if you are not satisfied with our checking, and so on. In short, the position of the terminal lines is based on the theory that unexplainable losses are an inevitable charge on the aggregate income from the joint business, that checking clerks will never become perfect, and sealing records will always be open to more or less suspicion. All this is put forward without in any way impugning the motives of the intermediate lines. Of course thousands of claims have been settled on no principle at all, the only rational explanation being that one line "bulldozed" another. As long as the degree of earnestness with which roads defend right principles and oppose wrong ones depends upon the amount of money involved in the claim under discussion, we fear there will continue to be far too many settlements on a false basis. What is needed is an agreement to settle according to some set of fixed principles regardless of whose ox is gored.

A New York paper recently printed an item concerning the Central of Georgia, in which it was asserted that train accidents were very frequent, that the rolling stock was in bad shape and that the road generally was in a wretched condition. A dozen passenger trains have been taken off, and it was alleged that this was from lack of engines and cars which had presumably been smashed to pieces in collisions or derailments. The officers of the road at once came out in a denial, stating that the lack of rolling stock, which exists only in the freight department, was caused by the increase of business due to the prosperity of the South. The trains taken off were experimental trains and had been on but a short time. It appears, however, that the diminution of passenger service has been considerable. Between Atlanta and Macon, where there were four trains each way, one has been taken off. Between Columbus and Americus and between Columbus and Birmingham there were two, and in each case one was taken off. Between Montgomery and Eufaula there were four, and two were taken off. The General Manager states that these trains did not pay expenses. The gist of the matter seems to be that the passenger traffic is very thin and the freight traffic is very large, and the company is not disposed to support one by the profits earned on the other. General Manager Gabbett states that 70-lb. rails are being laid on the main line, and that 900 ft. of track is ballasted with stone daily. The explanation given of the causes of train

accidents on the Columbus & Western seems rather weak. "The line has sharp curves and heavy grades; the trainmen have not become accustomed to the road so as to properly handle their trains." And by implication, the general newness of the road seems to be regarded as responsible for the disasters. Another way to look at the matter would be to regard the unsettled condition of the roadbed, the necessity for employing inexperienced men and the lack of various facilities as imperative reasons for moving with extreme caution.

Postmaster General Wanamaker has announced that he will, at the close of this year, present a gold medal to the most proficient railroad postal clerk in each of the 11 divisions, and a twelfth medal to the most expert in the whole country. A circular has been issued giving the conditions under which the examinations will be made. Such a move, by an experienced employer of large numbers of people in a private business, is worthy of notice, and may be suggestive to railroad officers. Hope of reward and fear of punishment are the two great incentives to faithful work, and every one knows that the former is the better motive in every case; and yet the principle is not applied in a tithe of the cases where it would be advantageous to use it. Even a mule will work more cheerfully under the incentive of a wisp of hay attached to a pole projecting 3 ft. beyond his nose than when forced by the lash. But with all due regard for sentimental considerations, we must confess that a medal is a somewhat unsatisfactory reward. It is not an entirely empty honor, but more widespread distinction can be won on the baseball field than in the prosaic work of studying geography and the art of "throwing" letters. The same may be said in the railroad service. A station agent can get more tangible honor by running for the Legislature than by striving for perfection as a maker of waybills or a seller of tickets. The reward should be in money, like the prizes given to the road masters and section masters on some roads. The true principle is that often employed in fuel saving on locomotives, where all the contestants who reach a certain standing receive some reward.

The best way to make a bad law odious is to enforce it. This, it seems, is to be the policy of the Chicago railroads with reference to the requirement that trains must not run faster than 10 miles an hour within the limits of that city. Hitherto the law has been badly stretched; this pleases the passengers, but when a wayfarer is killed or injured at a crossing, the satisfaction of its patrons is found to have no immediate cash value to a road, and the courts punish it for law-breaking. The dilemma is an exceedingly obstinate one, and as separation of grades must at best be a long way in the future, the only rational solution is in a compromise. The railroads probably ought to run a little slower, while the suburban passengers must be content to pay fares high enough to gradually remedy the unfavorable conditions. Compromise or no compromise, gates should be maintained, and gatemen and enginemen be trained to a high degree of vigilance. The railroads have to bear the immediate burden in any event, and they can legitimately recoup themselves only by collecting fares which may seem unreasonably high as compared with those charged on roads that are less burdened with obstacles to fast running.

A month ago a correspondent asked for an instance in which a wreck had taken fire from kerosene lamps. Because oil of 300 deg. fire test, and 120 deg. flash test, when in mass, would extinguish a lighted torch put into it, he was "led to believe that there is little danger from kerosene oil of 120 deg. flash test." The same day that his letter was published, Jan. 17, occurred the "tailender," near Cincinnati, in which the wreck took fire from the lamps. Of this we have positive assurance from officers of the road. On Jan. 22 a mail car on an Iron Mountain train took fire near Knobel, Ark., from a broken lamp. On Feb. 15 a train on the Wisconsin Central was run into by a runaway flat car, and the wreck is said to have taken fire from a lamp. Within less than a month, therefore, three more or less perfectly authenticated cases of fires from lamps have come to our notice. It is quite possible that others occurred in the same time. We suggest these three for the investigation and study of our correspondent, who seemed to have an honest desire to know whether or not petroleum is a really dangerous material for lighting cars.

Sheffield (Ala.) on Monday last celebrated the first shipment of iron from Alabama to Pittsburgh, Pa., by barges via the Tennessee and Ohio Rivers, the Muscle Shoals Canal having made this route now available for the first time. The first shipment was 5,000 tons, and was taken by nine barges, which were towed by the steamer "Percy Kelsey." The rate of freight is said to be \$2.50 per ton. The distance from Sheffield to Pittsburgh by rail is some 800 miles so that even by carrying at cost the railroads could not compete for this traffic. The new route will more probably affect the railroads in an indirect manner by changing the conditions of competition as between mines of different regions.

Janney Coupler Failures.

The McConway & Torley Company report that out of 67,643 Janney couplers, which on Jan. 1, 1890, had been in service during the past year and a half, they have reports of 2,808 breakages, due to the following causes:

Drawheads broken.	
Arm off.....	325
" " chipped.....	29
" " cracked.....	3
Bracket cracked.....	13
Upper lug off.....	45
Lower.....	85
Both lugs off.....	15
" " and back off.....	56
Head off at neck.....	112
" " shoulder.....	9
" " through shoulder.....	7
" " neck, and arm off.....	10
" " shoulder, and arm off.....	24
Split back.....	8
Back cut.....	4
Split face.....	20
Bracket off.....	92
End of barrel split off.....	
Draft bolt pulled through.....	
Miscellaneous.....	
Total draw heads broken.....	1,111

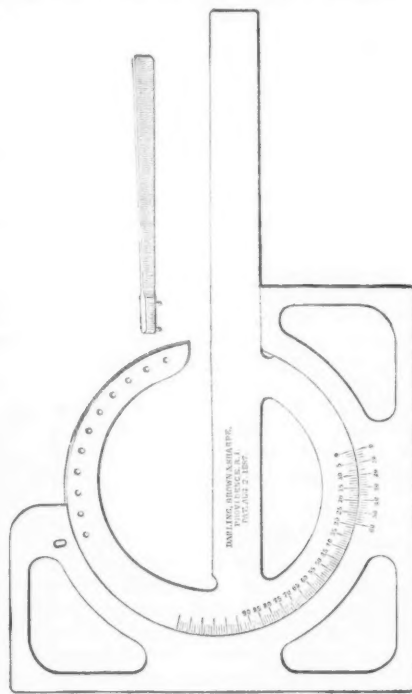
Knuckles broken.	
Upper lug off.....	575
" " chipped.....	304
" " cracked.....	148
Lower lug off.....	127
" " chipped.....	51
" " cracked.....	36
Both lugs off.....	104
" " chipped.....	84
" " cracked.....	7
Upper lug off, lower chipped.....	74
Lower lug off, upper chipped.....	85
Tail off.....	48
Miscellaneous.....	11
Total knuckles broken.....	1,697

The average time of service from which these records are derived is said to be about one year, so the result arrived at appears to be that one coupler in each twenty-four breaks each year.

Draughtsman's Protractor.

This protractor is made from $\frac{1}{8}$ in. sheet steel, and the length of blade is $8\frac{1}{2}$ in. The graduations read to degrees, and the vernier reads to two minutes. It is chiefly used in connection with a T square or straight edge. It can be quickly and accurately set by hand to any angle; a lever is, however, provided as of possible advantage in obtaining very fine settings.

There are no projections on either face, and, consequently, it can be used on either edge of the blade or either side up. This makes it particularly convenient in dividing circles, transferring angles, drawing oblique



lines at right angles to each other, or laying off given angles each side of a vertical or horizontal line without changing the setting.

In many instances the protractor takes the place of the ordinary 45-degree and 60-degree triangles, and it is also used as an extension to the T square when the work is beyond the end of the blade of the square.

The instrument is made by Messrs. Darling, Brown & Sharpe, Providence, R. I. Tables of settings for laying out tapers, dividing circles, etc., are furnished.

Computing Cost of Wheel Service.

The following memorandum on the method of computing the cost of wheel service, as suggested by the Wheelmakers' Association, was submitted by Mr. W. W. Snow at the last meeting of the New England Railroad Club.

In adjusting the price at which a scrap wheel should be charged back to the maker, either for the purpose of charging the short mileage or crediting the excess over the guarantee, it is understood that 45 per cent. of the

price at which the wheel is sold would represent its value as old material, and 55 per cent. would represent the actual cost to the railroad company.

Now suppose, for illustration, that a 33-in. passenger car wheel, weighing from 550 to 560 pounds, and guaranteed for 60,000 miles service, is sold for \$11. When that wheel is scrapped, 55 per cent. of its first cost, or \$6.05, is charged back to the maker. As an offset to this charge, the maker receives a credit for the service that the wheel has performed. On the foregoing basis of price, the rate of credit is ascertained by dividing \$6.05, the actual cost of the wheel to the railroad company, by 60,000, the guaranteed mileage—making 10.083 cents per 1000 miles of service. At this rate, if the wheel made but 50,000 miles, the maker's credit would be 50 times 10.083 cents, or \$5.04. As the wheel cost the railroad company \$6.05, according to the terms of the contract the maker would have to pay the difference between \$6.05 and \$5.04, the amount of service performed, or \$1.01. Any excess of mileage that the railroad company had to pay the wheelmaker would be computed on the same basis.

Standard Headlight Blind and Standard Bridge Mark, Wabash Railroad.

The accompanying cuts show the practice of the Wabash Railroad in covering headlights when engines are on side tracks or at the end of double track waiting for trains. The disc shown in fig. 1 is made of sheet iron,



Fig. 1.



Fig. 2.

and when not in use is placed in a rack back of the headlight. Fig. 2 shows the appearance of the number on the front of the headlight when running at night.

Fig. 4 shows a block which is used to indicate the numbers of bridges. It is bolted to a cross tie, as shown in the engraving, and is lettered on both faces after the manner shown in Fig. 3.

These are specimens of 47 illustrations shown in a large sheet issued by General Superintendent Magee, illustrating the standards of the road for engine and tail signals, switch targets, mileboards, whistling posts, etc. A similar list was issued by Superintendent Wade in 1888, and specimens of the drawings were shown in the *Railroad Gazette* for Nov. 2 of that year. The standard drawings now shown in the Time Convention code embody a development of Mr. Wade's plan. The sheet issued by Mr. Magee is a revision and enlargement of the older one.

"Reversed" Blue Prints.

Many of the engineers who visited English and continental shops last summer were struck by the common use of sun prints, showing blue lines on a white ground. For many purposes such prints are more convenient than the common blue prints. The system in general use there is that known as "Pellet's Direct Photo-Copying Process." It possesses the following advantages: It requires no dark room; it can be worked in all sorts of weather; it produces dark lines on a white ground; the copies can be colored, traced, altered and corrected, and they do not fade.

There are five distinct operations: First, exposure in the printing frame, as usual; second, floating of copy in yellow prussiate solution; third, washing with water; fourth, immersion in acid bath; fifth, final washing and drying.

The following are the directions for preparing the baths: Prussiate bath—Dissolve 12 to 15 lbs. of yellow prussiate of potash in hot water and allow it to cool. Decant the liquid into the bath. This liquid is a saturated solution of yellow prussiate of potash. Acid bath—In winter use one part of sulphuric acid to 24 parts of water. In summer, or in a well-heated room, use one part of acid to 32 parts of water. The following is a description of the process of development:

The copy must, after exposure, be placed face downwards on a board, and the edges turned up carefully by means of a straight edge, so as to form a sort of tray. $\frac{1}{4}$ inch in depth; this renders the sheet more easy of manipulation and leaves the back dry, when floated on the prussiate bath. The copy must then be placed face downwards and floated on the prussiate bath for about 30 seconds, care being taken not to let any of the prussiate solution get on the back. Pass the hand gently all over the back so as to dispel any air bubbles and to insure uniform contact everywhere with the solution. Raise the copy, and hold it up to see if the prussiate solution has been evenly spread all over it, holding the copy aslant in such a manner that the solution may drip off from one corner of it into the bath. The copy should be all the time carefully watched, and left exposed to the action of the prussiate until sufficiently developed, in which case the lines in the copy appear to stand out as if they were slightly raised. In winter this will take three minutes or more; in very hot weather, one to two minutes may suffice. The copy can be sometimes left five or six minutes or more, in fact, as long as the ground does not show blue spots; and the longer the copy is thus left exposed to the action of the prussiate solution, the darker the lines will come out.

Next, float the copy in first water bath, in order to check the further action of the prussiate, taking care to thoroughly wet also the back of the copy. The copy should be gently moved to and fro in the water, and fresh, clean water should be used after each immersion,

Then immerse the copy, face upward, in the acid bath, taking care that the entire copy, both front and back, is saturated with the acid solution. In winter the copy can be safely left immersed in the acid bath 10 minutes or more. In very hot weather two or three minutes' immersion may suffice. In any case the copies can always be re-immersed in the acid bath, even after they have been finished and dried, if they are found to be still yellowish and insufficiently bleached.

The copy is next placed face upwards in the empty second water tray, gently brushed to get rid of the superficial mucilage and finally copiously flushed with clean water, both front and back, so as to remove all traces of the previous chemical solutions.

When the background comes out bluish: If this arises from under exposure to the light, there is a uniform shade of blue all over; if, on the contrary, it arises from the copy having been too long exposed to the action of the prussiate solution, the background shows minute spots and the lines are ragged. If the lines come out defective, it is owing either to overexposure or to the lines of the tracing not being sufficiently opaque. If the lines turn a dark blue on immersion in the acid bath and subsequently wash off on being brushed, it is from having been exposed too short a time to the action of the prussiate solution.

George E. Chapman, 69 Victoria Street, Westminster, S. W., London, is the agent for this system of copying. The paper is prepared in width varying from 25 to 34 in.

TECHNICAL.

Locomotive Building.

The New York, Lake Erie & Western has let a contract for building 25 consolidation locomotives with Wooten fire boxes to the Baldwin Locomotive Works.

The New York, Providence & Boston has ordered five new locomotives. The Rhode Island Locomotive Works will build four, and the Manchester Locomotive Works one. Two of the engines are to be Moguls, and one will be an eight-wheeler.

The Cincinnati, Jackson & Mackinaw this week received five locomotives recently ordered of the Baldwin Locomotive Works.

The Memphis & Charleston has put two 44-ton switching engines in service at Memphis.

The Brooks Locomotive Works, Dunkirk, N. Y., are building 10 new engines for the Grand Trunk.

The Philadelphia & Reading is having 50 new locomotives built, and the entire order will be completed by June 1.

The Wrightsville & Tennille has received a new wood burning locomotive with a straight stack and 16 x 24 cylinders.

The Pittsburgh & Western has recently received 17 new locomotives.

H. H. Porter & Co., of Pittsburg, Pa., have just shipped a mine locomotive to the Crozier Coal & Coke Co., of Roanoke, Va.

The Pennsylvania Co. will soon award the contract for building 10 class R heavy freight engines, weighing 114,000 lbs., for the Southwest system. Forty-seven other locomotives will be built at the Fort Wayne, Columbus and Altoona shops; 18 of these will be class O passenger, five class M heavy shifting, and one other shifting engine and 23 class S consolidation locomotives. The consolidation and the shifting engines will be built at the Columbus shops. About 50 locomotives are to be added to the rolling stock of the Pennsylvania North-west system.

Car Notes.

The New York, Ontario & Western has let a contract to build 1,000 25-ton gondola coal cars to the Lafayette Car Works, of Lafayette, Ind. The cars will be equipped with air brakes and with the M. C. B. coupler, probably the Gould type.

The Lehigh & Hudson River Road is asking bids on about 200 25-ton gondola cars, and will let the contract for building them next week.

The Philadelphia & Reading is having constructed through a car trust, 43 passenger, seven combination and 4,000 gondola cars, to be delivered during the next three or four months.

The Terre Haute Car & Mfg Co. is working on an order for a number of refrigerator cars, equipped with air brakes, for the American Refrigerator Transit Co.

The Columbus, Hocking Valley & Toledo is reported in the market for 2,000 coal cars.

The Atlantic & Danville has under contract 100 cars for hauling logs.

The Cincinnati, Jackson & Mackinaw has received and has in service 350 of the 500 freight cars recently ordered.

The East Tennessee, Virginia & Georgia is asking bids on 1,500 cars which are to be equipped with the M. C. B. coupler.

The Pittsburgh & Western has received about 250 of the 1,500 freight cars recently ordered, and will receive most of the balance at the rate of 100 a week. The delivery of the order will be completed by June 1.

Several new passenger cars have recently been added to the equipment of the Fitchburg road.

The Russell Wheel & Foundry Co. of Detroit, Mich., recently shipped 100 heavy logging cars to the Norfolk & Carolina.

Bridge Notes.

A new bridge has been built by the Naval Academy authorities across College Creek, at Annapolis, Md.

The American Bridge Co., of Roanoke, Va., has submitted plans for a four span iron bridge to be erected over a ravine at Lynchburg, Va., to cost \$3,264, and \$1,298 added for masonry, a total of \$4,562. The King Iron Bridge Co., of Cleveland, has submitted plans for a heavier bridge, to cost \$15,000.

William P. Cooper has the contract for the construction of the bridge across the Halifax River at Daytona, Fla.

The Natchitoches Cane River Bridge Co. has been organized with David Pierson as president, to build the toll bridge over the Cane River at Natchitoches, La. It is to have two iron spans, 120 and 140 ft. long, with a 75 ft. draw.

The County Commissioners will let contracts for the building of two bridges, one across Holmes Creek and the other across Alligator Creek, near Chipley, Fla.

The bill to allow the town of Fredericksburg, Va., to issue \$20,000 of bonds to build a bridge across the Rappahannock River has become a law.

The Bridge Committee of Detroit, Mich., propose to erect a new bridge over the tracks of the Michigan Central at Fifteenth and Baker streets, Detroit.

Weatherford, Tex., will shortly ask bids to build a bridge over the Fort Worth street creek.

Foley Bros. have the contract for the new bridge over the Mississippi River at St. Cloud, Minn. The contract calls for \$50,500 for the entire bridge.

The iron bridge across the river near McRae, Ga., for the Savannah, Americus & Montgomery, will be completed this week.

A bill has been introduced in the Maryland Legislature to authorize Howard County to issue \$7,000 of bonds for rebuilding bridges.

The Montreal Bridge & Terminus Co. is petitioning the Dominion Parliament for a charter to build a bridge across the St. Lawrence at Montreal.

The joint committee of Middlesex, Kent and Elgin counties, Ont., have called for tenders for an iron and stone bridge at Rothwell, with a span of 230 ft. and 16 ft. roadway. The bridges will cost, it is estimated, about \$25,000, 50 per cent. of which will be borne by Kent, 27½ per cent. by Elgin, and 22½ by Middlesex.

The Mayor of Fort Colonge, Quebec, has asked the Quebec government to bear part of the cost of building the inter-provincial bridge over the Ottawa River from Quebec to the Ontario shore, at a point near Gower, Ont. The total cost of the bridge is to be \$70,000, and the government is asked to subscribe one quarter the expense.

The proposals for constructing the iron bridge over the Gasper Creek, near Hadley, Ky., have been rejected, and new bids are asked by J. C. Sims, of Bowling Green.

The ordinance providing for the building of a viaduct over the various railroad tracks on lower Fourth street, Sioux City, Ia., has been signed by the Mayor. The viaduct will be built across the Illinois Central, Chicago, St. Paul, Minneapolis & Omaha, and Chicago & North-western tracks. The ordinance has yet to be approved by the state railroad commissioners.

The United States States Army Engineers have notified the Covington & Macon to change its iron bridge over the Ocmulgee River, at Macon, Ga., to a draw-bridge. A county bridge, and two bridges of the East Tennessee, Virginia & Georgia, over the Ocmulgee River, are also to be changed.

Cofrode & Saylor, of Pottstown, Pa., have recently completed four iron bridges for the Lehigh & Hudson River road in Warren County, N. Y. Two of the bridges are deck girders and two are through girders, with 78 ft. spans. They replace four bridges erected in 1882, when the road was built.

The work on the bridge which the Central of New Jersey is building over the Delaware River at Easton, Pa., has been considerably delayed owing to the high water. One of the abutment piers has been finished, and the other nearly so. Of the three river piers, two are still under water. The Phoenix Bridge Co. has the contract for the superstructure.

The Central of New Jersey is to make extensive improvements and changes at Bayonne City, N. J., and in the work is included the construction of two bridges in the city.

The Chicago Bridge & Iron Co. has the contract to construct the bridge over the Cumberland River at Barbourville, Ky., for \$14,300. This company also has the contract for building the iron bridge over the Colorado River at Bastrop, Tex. The bridge will consist of one cantilever span of 332 ft. and two spans of 150 ft. each, with about 650 ft. of wooden approaches.

The county commissioners are considering the building of a bridge across the Brazos River at Hempstead, Tex.

The railroads and the city engineer of Duluth, Minn., have decided on the plans for the Sixth avenue bridge. It will be 490 ft. long with a 150-ft. span over six tracks.

The General Council of Atlanta has been asked to erect a bridge at Glenn street over the tracks of the East Tennessee, Virginia & Georgia.

The Commissioner of Public Works, of Chicago, is preparing estimates for a bridge over the Chicago River and the Illinois & Michigan Canal at South Wood street.

The Eastern Minnesota, Duluth & Winnipeg and Northern Pacific Roads are considering a plan to build another bridge from Duluth, Minn., to West Superior, near Grassy Point.

A bill to authorize the Commissioners of Franklin County to construct a bridge over the Olentangy River has been introduced in the Ohio Legislature.

The following 12 bids were received by the Board of Public Works, of St. Paul, Minn.: Milwaukee Bridge & Iron Works, \$79,876; George E. King, \$93,316; Detroit Bridge & Iron Co., \$76,190; Keystone Bridge Co., \$77,739; Wisconsin Bridge & Iron Works, \$79,834; Missouri Valley Bridge & Iron Works, \$85,788; Lassic Bridge & Iron Works, \$76,801; New Jersey Steel & Iron Co., \$74,708; Edge-Moore Bridge Works, \$69,071; Olaf Hoff, \$85,344; King Iron Bridge & Mfg. Co., \$87,141; Chicago Bridge & Iron Co., \$92,256. The engineer's estimated cost of the work is \$80,000. The award has not been made. The Board took the bid of the Edge-Moore Bridge Works under consideration.

Manufacturing and Business.

Keegan & Halpin, of 46 Washington street, New York, report that the Wells light is now used by the New York, Lake Erie & Western, Manhattan Elevated, Lehigh Valley, Norfolk & Western, Ohio, Indiana & Western, Beech Creek, Rio Grande Western, Denver & Rio Grande, Oregon Improvement Co. and the Mexican Central, and also by dredging companies and numerous private concerns.

The Niles Tool Works, of Hamilton, O., have finished and will soon ship an armor plate bending roll weighing 400,000 lbs. for the navy yard at Mare Island, San Francisco. The Cincinnati, Hamilton & Dayton has had a number of special platform cars built for transporting the machine, and the whole train will be run through to San Francisco.

The Fishkill Landing Machine Co. will soon complete a Corliss engine for the New York Central & Hudson River Railroad building in Sixty-second street, New York: The engine will have 1,000 H. P.; the top of the

topmost valve is 26 ft. from the base. The fly wheel is cast in four sections, in the form of four half wheels. The sections are joined so as to form two separate wheels, weighing 65,000 lbs. each, being 18 ft. in diameter. The two wheels when placed side by side as a fly wheel carry a belt 55 in. wide.

M. T. Davidson, of 77 Liberty street, New York City, has been awarded the contract for the erection of four horizontal engines for the Milburn pumping station of the Brooklyn Aqueduct extension at \$76,400. Mr. Davidson has previously furnished the city nine pumping engines. The engines which will be erected at Milburn are of the triple expansion type. One of this type of direct acting pumping engines, has been running at the Jamaica Station for nearly one year at the piston speed of 200 ft. per minute.

The Lloyd-Booth Co., of Youngstown, O., have commenced the erection of an extensive addition to their foundry, and will add a 30-ton steam crane. The firm is now shipping a sheet and plate mill to the Cambridge Iron & Steel Co., of Cambridge, O., and is making shears and roll lathe for the Chicago Forge & Bolt Co., of Chicago, Ill., and shears for the National Forge & Iron Co., of Chicago, Ill., which has been previously furnished six by the firm.

Iron and Steel.

The business heretofore conducted by M. V. Smith, metallurgical engineer, of Pittsburgh, Pa., will hereafter be carried on by the Pittsburgh Metallurgy Co. Mr. Smith will remain with the company as engineer.

The Langdon furnace, at Langdon, Ala., will soon be lighted, and will make about 40 tons of car-wheel iron per day.

The Sharon Iron Co., of Sharon, Pa., will erect six additional furnaces in its puddling department and make several additions to its sheet mill department.

Steps are being taken to purchase a plot of land in Monongahela, Pa., near the river and the railroad tracks, as a site donated by the citizens to a new steel firm, the Monongahela Steel Co.

The Bethlehem Iron Co., of Bethlehem, Pa., has advanced the wages of employes 15 per cent.

The rolling mill of the Minnesota Car Co., at West Duluth, Minn., was burned Saturday last.

The Pottsville Iron & Steel Co. of Pottsville, Pa., is said to be negotiating with the Philadelphia & Reading Coal & Iron Co., owners of the West Hamburg Rolling Mill, for a lease of the puddling department of that plant.

Jones & Loughlins (Lim.), of Pittsburgh, are erecting an additional blooming mill, a duplicate of their present one. The Morgan Engineering Co. of Alliance, Ohio, will furnish the main engine, and the Crane Elevator Co. of Chicago will furnish six reversing engines for the manipulation of the billets.

The Texas Rolling Mill Co. has been incorporated with G. E. Beach as President and General Manager, to operate a rolling mill in Fort Worth, Tex.

Jay C. Morse has been elected President of the Illinois Steel Co., and the old Board of Directors and other officers have been re-elected, with the exception of the Treasurer and Secretary and Assistant Secretary, both of whom declined re-election.

The company reports the total value of finished products shipped in the eight months of 1889 after its organization as \$15,275,520. The company received a total of 2,048,688 tons of raw material and shipped over half a million tons of finished products. The total pay-roll amounted to \$3,680,883, and the purchases of miscellaneous stores and supplies amounted to \$693,000. The company received 88,554 cars of material and shipped 40,954 cars. There were employed directly at all the works on an average per day 8,360 men, besides the employment given indirectly to a large additional force in the production of coke, coal, iron ore, limestone, and other materials.

The directors of the Reading Iron Co. have voted to increase the capital from \$300,000 to \$1,000,000. The additional capital is to be used to improve and repair the works, to acquire additional furnaces, and to provide sufficient working capital. The capacity of the works has been recently greatly increased, and the four furnaces may soon be able to turn out over 2,000 tons of pig iron a week. The tube works, which can turn out nearly 4,000 tons a week, are now being run at almost their full capacity.

The Dean Crosshead and Guide.

The Rhode Island Locomotive Works are building two locomotives for the New York, Providence & Boston, to be equipped with the Dean guide.

An Electric Locomotive.

Some interesting experimental trials have been made on the Southwark Subway (London) with the electric locomotive, by which the trains on this new underground line are to be worked, and highly satisfactory results have been obtained. With a train of three carriages, carrying 100 persons—the maximum load to be carried by any train when the line is open for traffic—a speed of 20 miles an hour was obtained, and the locomotive alone ran at a speed of 30 miles an hour. It is possible, before the subway is formally opened for traffic in the spring, that further improvements in the electrical plant may be made, by which the speed may be still further increased. It is believed by many engineers that the success of the subway will lead to a great development of underground traveling, by which alone the congested condition of some of the London thoroughfares at certain periods of the day can be relieved.—*Practical Engineer.*

Chicago Elevated Road.

The contract for three and a-half miles of the South Side Elevated Road, Chicago, has been let to Carnegie, Phipps & Co., of Pittsburgh. The work will be done at the Union Iron Mills, and will require nearly 8,000 tons of iron. The material is to be all ready by July.

Shipyard at Sparrow Point.

The Pennsylvania Steel Co. has begun active operations on the proposed shipyard at Sparrow Point, near Baltimore. The yard will be directly opposite Fort Carroll. Forty acres of land have been staked off for the purpose, to which about ten acres of made land will be added by filling up a marshy place now about one foot under water. The building of two ships will be started at once by the laying down of the keels of the two 3,000-ton steamships which the company is going to build for its own use, to bring ore from Cuba.

THE SCRAP HEAP.

Notes.

A union station is to be built at Portsmouth, Va., by the Seaboard & Roanoke and Atlanta & Danville companies.

The roundhouse of the Carolina Central, at Charlotte, N. C., was burned Feb. 11. Two locomotives were destroyed. The insurance was \$20,000.

A union station is to be built in Norfolk, Va., by the Norfolk & Western, Norfolk & Carolina, Norfolk & Southern and Norfolk & Virginia Beach roads.

Frank Campbell, ticket agent for the Chicago & Alton, at Godfrey, Ill., repulsed three would-be robbers who attacked his office on the night of Feb. 11.

The officers of the Pennsylvania, both east and west of Pittsburgh, have now ordered conductors as well as station agents to turn in all passes received from other roads.

The gardening department of the Nashville, Chattanooga & St. Louis has just received a large consignment of evergreens, to be used in adorning the station yards along the road.

The strike of the New York Central yardmen at Suspension Bridge has petered out. The striking brakemen have asked Agent Paddock to take them back, and he has referred the matter to Superintendent Burrows.

The Philadelphia & Reading has begun the construction of a large greenhouse near Wayne Junction, Philadelphia, in which to raise flowers to be used in ornamenting the grounds surrounding the stations along the road.

Contracts have been signed between the Housatonic Railroad Co. and the United States Express Co., whereby the latter will do the express business on the roads operated by the former, beginning on March 1. The Adams Express Co. now controls these routes.

The New York State Railroad Commissioners have requested from the railroads an expression of opinion as to changing the date for annual reports to June 30, so as to correspond with the date fixed by the Inter-State Commerce Commission. The date in New York can be changed only by the legislature.

The first annual report of the Philadelphia & Reading Railroad Relief Association, shows that during the year the contributions to the fund amounted to \$200,015; the payments in sick, accident and death benefits, \$98,398, leaving a surplus of \$101,617. The number of disablements during the year was 4,544, of which 1,670 were caused by accident and 2,865 by sickness. The deaths were 120, of which 47 were the result of accident, and 73 from natural causes. The membership includes 96 per cent. of all eligible employees of the company.

A decision, just reported from the New York Court of Common Pleas, concerns the use of the streets of New York city for advertising purposes by the railroads holding a franchise for the purpose of transporting passengers. The case was that of the placarding of advertisements upon the stations of the elevated roads, the court ruling this to be "the attempted use of the public streets for a private purpose, and one not authorized by law." The stations upon which these signs are placed are built upon land not owned by the railroad company, but granted from the public use for specified purposes. Advertising is not one of those purposes. The court declares that "the railroad company has no power under its charter to engage directly in the advertising business," and, therefore, cannot use its privileges for the purpose of presenting advertisements "where the advertisements have no connection with the business of the company or the convenience of passengers."

Our Steel Rail Production for 1889.

The bulletin of the American Iron and Steel Association returns 1,408,066 gross tons as the production of mills producing their own ingots. The estimated production of ingots is about 2,900,000 gross tons. Our production of both ingots and rails for the last 10 years was, on this basis, as below, to which is added the percentage of our total make that went into rails.

PRODUCTION OF BESSEMER IN GROSS TONS.			
	Ingots.	Rails.	P. c.
1880.....	1,074,361	852,196	79.3
1881.....	1,374,250	1,187,770	86.5
1882.....	1,514,688	1,284,067	84.7
1883.....	1,477,345	1,148,706	77.7
1884.....	1,375,523	996,983	72.5
1885.....	1,519,430	959,471	63.1
1886.....	2,269,190	1,562,410	68.8
1887.....	2,936,033	2,049,638	69.8
1888.....	2,511,161	1,365,921	54.4
1889.....	2,900,000	1,408,066	50.6

Showing a nearly constantly increased employment of Bessemer steel for structural purposes.

The production by half years and by localities, as ascertained by Mr. Swank, is given below in net tons of 2,000 lbs. each:

STATES.	First half 1889. Net tons.	Second half 1889. Net tons.	Total, 1889. Net tons.	Total, 1888. Net tons.
Pennsylvania.....	523,882	578,635	1,102,517	911,206
Illinois.....	179,201	340,833	520,034	488,639
Other states.....	16,489	5,174	21,663	129,987
Total, 1889.....	719,572	924,662	1,644,234	1,529,832
Total, 1888.....	775,261	754,571	1,529,832

Bad for the Sled Locomotive.

The Michigan lumberman pats his logging railroad on the back this winter with more affection than ever before. His logs are dumped at the landing with the regularity of clock work day after day, while those of his neighbors who depend on horses are oftentimes left on the skids. When he goes to bed at night, the thought as to whether the morrow will bring forth frost or slush does not disturb him. Great is a logging railroad in an open winter.—*Northwestern Lumberman.*

Peoria Superintendents.

The superintendents of eleven roads met at Peoria on Friday last and perfected a permanent organization for an association. E. N. Armstrong, of the Toledo, Peoria & Western, was made president.

One Cent a Mile for Employees.

The Cleveland, Cincinnati, Chicago & St. Louis has issued a notice to employees that all requests for transportation must hereafter be made through the head of the department in which the applicant is employed. Notice is also issued stating that it is necessary that the amount of free transportation for employees and their families be reduced, and for this purpose a special form of employees' ticket which can be used between all stations has been issued, and will be sold at the rate of one cent a mile for distance traveled, to employees, for use of members of their families who are actually dependent on them for support, and only upon presentation of a proper blank bearing the signature of the head of department in which applicant is employed. Commutation tickets between stations for individual use of employees or members of their families dependent upon them for support will be sold at one-half the regular commutation rates upon presentation of proper request from head of department in which applicant is employed.

Street Railroads in Massachusetts.

We take the following figures from the Commissioners' annual report: The whole length of street railroad track, including branches, sidings and double track, amounts to 620 miles, being an increase of 59 miles. The average cost was \$16,174 per mile for permanent way, \$7,827 for equipment, and \$10,429 for land and buildings; making a total cost of \$34,431 for each mile of road owned. The number of round trips was 3,446,709, an increase of 226,191 over the previous year; with a mileage of 24,259,491, an increase of 1,014,724. Passengers were carried to the number of 148,189,403, being an increase of 13,711,084 over the number carried during the preceding year. The number of passengers carried on the street railroads exceeded the number on the steam roads by 54,600,104.

The gross income was \$7,554,509, an increase of \$694,004. There was an increase of net income of \$275,837, with an increase of dividends paid amounting to \$213,032. The average amount received for the conveyance of each passenger was 5.10 cents, and the average cost of carrying each person amounted to 4.17 cents; the net profits to the companies being .93 cent against .84 cent as compared with last year. The average cost of a round trip was \$1.79, with a profit of 40 cents, being an increase of six cents over last year.

The following table shows the application of various systems of electric traction:

RAILROAD.	Miles of electric road, where overhead system in operation Sept. 30, 1889.	Name of system.	Speed of cars per hour, where limited by horse cars.	Miles of electric road, where overhead system, under construction Sept. 30, 1889.	Miles of electric road, where storage battery, under construction Sept. 30, 1889.
Beverly & Danvers..	4.25	Sprague	8	3.00	
East Side	1.84	Thomson-Houston	6 to 8	1.17	
Hoosac Valley	1.84	Bentley	7 1/2	4.50	
Lynn & Boston	5.13	Sprague	7 1/2		
Lynn Belt	2.89	Sprague	2 00		
Lowell & Dracut	1.80	Thomson-Houston	6		
Marlborough	4.50	Thomson-Houston	12		
Newton	2.00	Thomson-Houston	7 to 12	21.24	
Naumkeag	28.00	Thomson-Houston			
Plymouth & Kingston	50.51			38.01	3.00
Revere					
West End					
Total					

Forged Tickets.

On the occasion of the meeting of the National Electric Light Association at Kansas City last week, the railroads authorized a return fare for the delegates at one third of the regular rates, on the certificate plan. Finding that Eastern ticket brokers were purchasing large quantities of first class tickets for Kansas City, the passenger agents suspected some irregularity and sent a warning to Kansas City. It was found that a man went to the secretary of the Electric Light Association (who was to countersign certificates) and secured from him a copy of his autograph and the official stamp of the Association on the plea that they were needed in a railroad ticket office for the purpose of identifying genuine certificates. These when obtained were at once used by the scalpers as patterns for a counterfeit stamp and signature. Another man also called on the secretary and demanded his signature to a lot of certificates but was unsuccessful. Entreaties, threats and offers of money were used to enforce the argument. A large number of forged tickets were presented at the ticket offices, each holder wearing a badge of the Electric Light Association, which had been furnished by the scalpers. It is believed that all bogus tickets were detected and refused. Four ticket firms, members of the American Ticket Brokers' Association, assert their ignorance of the practices referred to, and each offers \$100 reward for the arrest and conviction of the guilty parties.

Galveston Harbor.

The people of Galveston are hopeful of getting a Congressional appropriation of \$6,200,000 for the completion of harbor improvements. The work done so far is confined to the south jetty, which already extends 16,000 ft. beyond Galveston Island, and must be extended four miles further, to the crest of the bar. Another jetty, five miles long, is designed to be built from the opposite side of the bay, gradually approaching the south jetty until the two will be about 600 ft. apart at the entrance. There does not seem to be any immediate prospect that the work will get anything like the \$6,200,000 asked for this year.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads

In California, an act of Congress of 1871 had granted certain lands to the S. P. Co., to aid in the construction of a branch line, and provided that if its route, when designated, should be found to be on the line of another road to which land had also been granted, the amount there-

tofore granted should be deducted from the quantity thereby granted to the S. P. Co. so far as their routes should be on the same general line. The map of the route of the A. & P. Co. was afterward filed, and the routes of both roads were for some distance on the same general line. The S. P. Co.'s route included in its 10-mile limit part of the indemnity strip of the A. & P. Co., at points where the A. & P. Co. would have had the right to make selections of lands in lieu of others already taken up. The Federal Court holds that the S. P. Co. acquired no rights as to lands in said indemnity strip so far as the two routes were on the same general line.

In Iowa, the Supreme Court decides that, though a railroad's charter requires it to pave inside of its rails, a subsequent ordinance passed by a city, requiring it to pave one foot outside of its rails, is not in violation of the obligation of the contract, assuming plaintiff's charter to have been a contract, as the city did not thereby preclude itself from imposing additional burdens, as authorized by the Code, which provides that the privileges and franchises of corporations shall at all times remain subject to legislative control, and may be altered whenever the general assembly shall deem necessary for the public good.

The Supreme Court of Tennessee holds that a statute providing that a license tax shall be paid by express companies for transporting one or more packages between points within the State, the amount of such tax being regulated by the length of the company's lines, is, in effect, a tax on interstate business, and is unconstitutional.

A New Jersey statute provides that the charter of every corporation which shall be thereafter granted by the legislature shall be subject to alteration, suspension, and repeal. By a charter granted thereafter to a railroad company it was required to construct and maintain bridges where highways should cross its railway. The Supreme Court rules that, although the charter did not contain a reservation of power in the legislature to modify or change the contract, the legislature could impose upon such company the duty of constructing and maintaining bridges on the line of highways across rights of way which it had merely graded, and upon which the rails were not laid.

A statute of West Virginia provides that railroad companies may, for the purpose of excavations and embankments, take such land as may be necessary for the proper construction, repair, and security of the railroad; and that they may construct railroads along or upon any stream, street, highway, etc., which the route of such railroads shall touch; but that such stream, street, etc., shall be restored to its former state, or to such state as not unnecessarily to have impaired its usefulness. The Supreme Court rules that a railroad was authorized to construct its road in a cut or excavation in a public street of a city, the graded portion of which was 24 ft. wide, where 22 ft. of such graded portion were left unobstructed.

In Kentucky the Court of Appeals holds that where a statute prohibits more than one question of taxation to be submitted to the voters at any one election, an election at which the question of subscribing to the capital stock of two different railroad companies is submitted is null and void as to both.

An act of Congress of 1862 provided "that there be, and is hereby granted" to a railroad company, for the purpose of aiding in the construction of said railroad, certain sections of public lands along the proposed line, reserving all mineral land from the operations of the act, and provided that patents should issue to the company for the lands granted, at the completion of the road. The Supreme Court of Nevada holds that the act was an absolute donation, and imported a grant *in presenti*, and the company, having completed its road, could not evade taxation on the land, on the ground that such land had never been "selected by, set off, certified or listed" to it by the government of the United States, nor on the ground that the railroad had not paid the costs of surveying and selecting such lands.

In Georgia the Supreme Court holds that where a statute grants to a railroad company part of the public domain of a city, providing the assent of the city is obtained, the terms, conditions, and limitations of the grant to be matter of agreement between the city and company, and the latter accepts the grant with the limitation put on it by the city that the estate acquired shall exist so long only as the property shall be used for railroad purposes, as specified in the statute, the property, if not appropriated to such purposes within a reasonable time, will cease to be affected by the statute, and will again become part of the public domain of the city, there being no consideration for the grant other than the local benefits arising from the use of the premises in the manner contemplated.

Carriage of Goods and Injuries to Property.

In Missouri the agent of the agent of the Missouri Pacific, at Hannibal, Mo., was indicted under sec. 2 of the Interstate Commerce act for unjust discrimination in charging a grocer at that place for the carriage of a lot of sugar to Hepler, Kan., more than he charged the C. B. & Q. Railroad for a similar service. It appeared that the defendant's road received from the C. B. & Q., under an alleged traffic arrangement, two barrels of sugar shipped by the latter company from Chicago, and carried it to Hepler, Kan., for 34 cents per 100 lbs., that being its proportion of a rate of 51 cents per 100 lbs. from Chicago to Hepler. About the same time it charged the local shipper at Hannibal 46 cents per 100 lbs. for carrying a barrel of sugar from there to Hepler. The jury returned a verdict of guilty. On appeal, the U. S. Circuit Court affirms the judgment, holding that Congress did not intend to leave carriers the power to grant undue preferences, or to subject persons or places to undue disadvantages, by any devices, or by any adjustment of joint through rates with relation to local rates. When two carriers establish a joint through rate, the proportion thereof that one carrier receives for carriage of property between two points on its line may be compared with its local rates between the same points, for the purpose of establishing that an unreasonable preference has been given, or that a shipper has been subjected to an undue disadvantage.

In Pennsylvania the Supreme Court holds that under the statute providing that, when the Pennsylvania Railroad Co. shall find it necessary to change the site of any portion of any turnpike or public road, it shall cause the same to be reconstructed forthwith at its own proper expense, etc., the necessity for such change is to be determined by such company; and when, in improving its tracks, it has removed a crossing, supplying a new and safe one, which has since been used by the public, the supervisors of the township have no authority to restore the old crossing.

In Kansas the plaintiff's hogs strayed on the track at a point where it passed through plaintiff's farm, and were killed. The road was inclosed with a wire fence, as prescribed by statute, with the exception of a gate, the lower board of which was further from the ground than the law allowed. The Supreme Court holds that the fact that the hogs passed under such gate did not render defendant liable, where nowhere was the fence as lawfully constructed sufficient to prevent the hogs from going on the track.¹¹

In Texas the Supreme Court rules that where horses are injured by being struck by defendant's train, the owner, if entitled to recover at all, can recover reasonable compensation for attention and expenses in an attempt to cure them, if rendered in good faith.¹²

Injuries to Passengers, Employees and Strangers.

In Kentucky the plaintiff bought a ticket to a point on defendant's road. A wreck occurred on the way, and the train was delayed overnight. Plaintiff, being sick, was unable to wait on the train, and asked the conductor if the check he had given him would be good for the next day, and was told it would not. The next day plaintiff boarded another train for his destination. After some dispute as to riding on the check, he offered the regular fare, but, on refusing to pay the extra price demanded when tickets are not bought before entering the train, he was ejected. The Court of Appeals decides that plaintiff was entitled to damages for such ejection.¹³

In Louisiana the Supreme Court holds that railroads have the right to adopt reasonable regulations as to the method of paying fares by passengers, and a regulation requiring passengers who board the cars without purchasing tickets to pay 25 cents extra is not unreasonable; and a passenger who refuses to comply with it may be lawfully ejected in a proper manner and at a proper place. Exempting from such regulation passengers who board a train at stations where tickets are not on sale is just, and does not invalidate the regulation as to other passengers. The fact that the company gives a drawback coupon for the extra fare, on which the passenger may collect it back from any agent at a station, does not affect the validity of the regulation.¹⁴

In New York the Supreme Court holds that an agreement between a railroad company and an express company, that the former shall not be liable for any injury done to any employee of the latter, it being part of a contract by which the former was to carry goods for the latter at special rates, and to allow a messenger of the latter to go on each train free of charge, does not exonerate the railroad company from liability for its negligence resulting in the death of a messenger, who was ignorant of such agreement.¹⁵

In New York in an action by a passenger on an elevated train against the company for negligence in starting the train in such a manner as to throw into confusion the passengers who had alighted on a narrow platform, thus causing plaintiff and others to be thrown down and injured, the conductor testified that a gate by which plaintiff left the car was opened by a passenger. A brakeman stated that he did not open it, but that some of the passengers did. The Supreme Court rules that it was not error in such case to refuse to charge that if plaintiff's fall was proximately caused by others pressing on him from behind, resulting from a passenger being carried against him in his attempt to get on the train again, defendant was not liable, when the jury are charged that if the sole cause of plaintiff's fall was from the pressure from behind, and the jury are unable to determine the proximate cause of the pressure, they should find for defendant.¹⁶

In Maine the Supreme Court holds that the facts that a defective car was attached to a train, with nothing to show that it differed from the other cars, and that it became necessary to use it in such a manner as resulted in the injury of an employee, he having no knowledge of its condition, are *prima facie* evidence of negligence on the part of the railroad company, without proof that it had notice of the defect in such car.¹⁷

In Minnesota, in an action by a brakeman to recover for injuries caused by an alleged defective draw-head on a car, defendant introduced in evidence certain rules adopted by it in relation to the coupling of cars, prohibiting the use of the hands for such purpose, and ordering the use of a stick or pin. The superintendent of defendant testified that such rules were in use when plaintiff was injured, but could not testify that they had been sent to the "heads of the management of the yards" where the accident happened. Plaintiff testified that no such rules were enforced in the yards while he was there, and he knew nothing about them. The Federal Court holds that it was for the jury to decide whether plaintiff was bound by such rules, and whether they were known to him and violated by him, and affirms a verdict against the railroad.¹⁸

In New York, the Court of Appeals decides that a railroad is responsible to its brakemen for injuries caused by such a defect in the coupling machinery of a foreign car used upon its road, as could be discovered by ordinary inspection; and, where it brings upon its road cars with buffers of different heights, it does not fulfill its duty by simply furnishing coupling links which might be used safely on such cars, as it is not the duty of the brakemen to inspect the cars to ascertain whether the coupling appliances are safe.¹⁹

In Minnesota the plaintiff, employed as brakeman by defendant, was injured while coupling a passenger engine with a freight car. It appeared that plaintiff performed the service required of him in such a manner that he would not have been injured if the engine had been supplied with the ordinary draft-iron used on freight trains; but it appeared that the draft-iron used was one designed for passenger trains, with which plaintiff was not acquainted, having had but little experience, and having been employed only on freight trains. Nor had plaintiff received any instructions as to coupling under such circumstances. The Supreme Court affirms a verdict against the railroad.²⁰

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Cincinnati, Sandusky & Cleveland, 1½ per cent., payable March 10.

Columbus, Springfield & Cincinnati, 1½ per cent., payable March 10.

Delaware & Bound Brook, quarterly, 2 per cent., payable Feb. 19.

Eastern of Massachusetts, 3 per cent. on the preferred stock, payable March 1.

Hartford & Connecticut Western, \$1 per share, payable March 1.

Marquette, Houghton & Ontonagon, 3 per cent. on the preferred stock, payable Feb. 15.

North Pennsylvania, quarterly, 2 per cent., payable Feb. 25.

St. Louis, Iron Mountain & Southern, 4 per cent., payable Feb. 8.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Adirondack, special, 21 Cortlandt street, New York City, March 14, to act upon a proposed issue of bonds.

Atlanta & Charlotte Air Line, annual, 48 Wall street, New York City, March 12.

Colorado Central, special, Union Depot, Denver, Colo., March 17, to act upon a proposed consolidation.

Concord & Montreal, special, Concord, N. H., Feb. 26, to refund bonded indebtedness.

Delaware, Lackawanna & Western, annual, 26 Exchange Place, New York City, Feb. 28.

Denver, Marshall & Boulder, special, Union Depot, Denver, Colo., March 17, to act upon a proposed consolidation.

East Tennessee, Virginia & Georgia, special, Knoxville, Tenn., April 15.

Georgetown, Breckenridge & Leadville, special, Union Depot, Denver, Colo., March 17, to act upon a proposed consolidation.

Greeley, Salt Lake & Pacific, special, Union Depot, Denver, Colo., March 17, to act upon a proposed consolidation.

Illinois Central, annual, Chicago, Ill., March 12.

Kansas City, St. Louis & Chicago, annual, 511 Olive street, St. Louis, Mo., March 11.

Manhattan Elevated, special, 71 Broadway, New York City, Feb. 26.

Missouri Pacific, annual, St. Louis, Mo., March 11.

New Orleans & Northeastern, annual, New Orleans, La., March 3.

New York, Susquehanna & Western, annual, 15 Cortlandt street, New York City, Feb. 27.

St. Louis, Iron Mountain & Southern, annual, St. Louis, Mo., March 11.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Association of General Passenger and Ticket Agents* will hold its next annual convention in the City of Mexico, Mex., March 8.

The *Master Car Builders' Association* will hold its next annual convention at Old Point Comfort, Va., June 10. Rooms should be secured of Mr. F. N. Pike, manager, Hygeia Hotel, Fortress Monroe, Va.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *Northwest Railroad Club* meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Saturday following the second Wednesday of each month at 7:30 p. m. in the director's room of the St. Paul Union station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meeting on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at Boston, at 7:30 p. m., on the third Wednesday in each month. The next meeting will be held at the American House.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 122 Girard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the Fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month. The annual dinner will be held at the St. James Hotel, Kansas City, Feb. 28, at 8 o'clock p. m.

The *Engineering Association of the Southwest* holds regular meetings on the second Thursday evening of each month at 8 o'clock, at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Canadian Society of Civil Engineers.

A meeting of the Toronto branch of this society was held at Toronto last week, at the School of Science. There were 20 members present. A paper on screening coal was read by the secretary, which was followed by a discussion. A paper on cement was then read, the discussion on which, on the suggestion of Mr. Rust, was postponed till the next meeting.

Civil Engineers' Club of Cleveland.

At the February meeting, Mr. Edward Lindsley read a paper on the "Improvement of railway terminal facilities as related to the transfer of coarse bulk freight." Mr. Lindsley presented a model showing a method of unloading coal or ore cars.

Mr. James Ritchie's paper was on specifications for steel and iron. Mr. Ritchie asked for more uniform specifications in bridge engineering. A discussion arose over the use of steel rivets in steel work, and ex-City Engineer Force, Mr. C. P. Leland, and Mr. J. L. Gobeille participated.

Assistant Engineer M. W. Kingsley, of the waterworks department, read a paper entitled "Notes on the New Waterworks Tunnel," illustrated by photographs. The following candidates were elected active members: Messrs. Ernest Augstrom and James C. Wallace. The following banquet committee was appointed: W. H. Searles, A. Mordecai, J. L. Gobeille, H. C. Thompson, C. G. Force, Jr., N. B. Wood, S. J. Baker, C. P. Leland, H. M. Claflin.

Claim Agents' Meeting.

The fourth annual meeting of the Claim Agents' Association of the Eastern, Middle and Southern States will be held at "The Arlington," Washington, D. C., on March 6, next. Lines wishing to attend, but which have not been invited, should apply to F. B. Goodall, Secretary, 243 South Fourth Street, Philadelphia.

Engineers' Club of Kansas City.

A regular meeting was held Feb. 3, 1890, in the Club Room at 8 p. m. Vice-President A. J. Mason in the chair. K. Allen Secretary. There were present twelve members and two visitors.

Mr. Thos. Knight read a paper on "Some Geological Field Work in Southern Missouri," being a general résumé of investigation undertaken to determine the following points:

1. The mineral resources of the country, having special regard to the prospects for coal, iron, lead, zinc, copper and tin.

2. Its general economic productions with a view to a systematic and extended immigration.

3. The sufficiency, or otherwise, of the existing railroad system, and to what extent capital might be employed in extension.

The information demanded by the instructions thus itemized being such as to give prominence to the geological aspect of the question, it was from this standpoint that the subject was considered. The mineral resources of the State, together with the extent of coal fields, were pointed out; and some examples given of metamorphosis and the deposition of metallic ores. Incidentally the opening up of a rich mining district tributary to Kansas City was alluded to, and an enumeration made of the economic productions of the State.

The Dinner Committee has arranged to hold the Annual Dinner at the St. James Hotel, at 8 o'clock p. m., Friday, Feb. 28.

PERSONAL.

—Mr. H. A. Phillips, Superintendent of the Worcester division of the Fitchburg road, has resigned and the jurisdiction of Mr. J. F. Adams as Superintendent has been extended over that division.

—Mrs. Charles D. Haines has been elected President of the Haines Medina Valley Railroad, a short Texas line recently placed under contract. The husband of Mrs. Haines is building the line.

—Mr. James A. Cowing, the first treasurer of the New York Elevated Road, died suddenly from heart failure Feb. 14, at his home in Brooklyn. When the road was leased to the Manhattan Mr. Cowing retired, and has not since been in railroad service.

—Mr. Benjamin V. Abbott, a legal writer of wide reputation, died at his home in Brooklyn Feb. 17, after a long illness. Mr. Abbott was the author of a number of digests and compilations and a valued contributor to the *Railroad Gazette* on legal matters.

—Mr. J. R. McDonald, President of the Seattle, Lake Shore & Eastern, has resigned and Mr. A. S. Dunham has been appointed Managing Trustee to succeed him. Mr. McDonald has been President of the road since its organization.

—Mr. C. F. Zimmerman, Assistant General Freight Agent of the Denver & Rio Grande, has resigned to accept the position of General Agent of the Atchison, Topeka & Santa Fe in Denver, to succeed Mr. H. G. Krake, resigned, to enter the service of the Missouri Pacific.

—Mr. D. Miller, General Freight Agent of the St. Louis, Arkansas & Texas, has been appointed General Traffic Manager of the road in Arkansas, Missouri and Louisiana. Mr. L. F. Day has been appointed General Freight Agent, and E. W. La Beaume General Passenger Agent.

—Mr. H. C. Wicker, lately Traffic Manager of the Chicago & Northwestern, has returned from a three months' trip to Europe. He has been elected General Manager of the Harney Peak Tin Mining & Manufacturing Co., which owns extensive mining claims about Hill City, South Dakota.

—Norman Smith, eight years old, son of William Smith, of Wilbur, N. Y., flagged a West Shore passenger train near the high bridge that spans Rondout Creek last Saturday, and saved it from running into a landslide. The train was backed to Kingston, and the passengers made up a purse of money for the lad.

—M. H. H. Vreeland, who has been Superintendent of the New York & Northern for the last year, has been appointed General Superintendent of the line. He entered the service of the company in 1881, and was appointed Trainmaster in 1887. He was previously, between 1875 and 1881, in the transportation department of the Long Island road.

—Mr. Robert Blee, General Superintendent of the Cleveland, Cincinnati, Chicago & St. Louis, has resigned. He has held the position since the consolidation of the old Big Four and Bee Line roads, and was previously Superintendent of the Columbus & Cincinnati division of the Cleveland, Columbus, Cincinnati & Indianapolis,

¹ U. S. v. S. P. R. Co., 39 Fed. Rep., 132.
² S. C. T. R. Co. v. Sioux City, 43 N. W. Rep., 224.
³ U. S. Ex. Co. v. Allen, 39 Fed. Rep., 712.
⁴ Montclair v. N. Y. & G. L. R. Co., 18 Atl. Rep., 242.
⁵ Arbenz v. W. & H. R. Co., 10 S. E. Rep., 14.
⁶ Christian County v. Smith, 12 S. W. Rep., 134.
⁷ State v. Cent. Pac. R. Co., 22 Pac. Rep., 257.
⁸ City of Macon v. E. T. V. & G. R. Co., 9 S. E. Rep., 1127.
⁹ U. S. v. Tozer, 39 Fed. Rep., 369, 394.
¹⁰ Penn. R. Co. v. Duhm, 18 Atl. Rep., 322.
¹¹ Leebick v. R. V. & S. W. R. Co., 21 Pac. Rep., 796.
¹² G. C. & S. F. R. Co. v. Keith, 11 S. W. Rep., 1117.
¹³ L. & N. R. Co. v. Wilsey, 12 S. W. Rep., 275.
¹⁴ McGowan v. M. L. & T. R. & S. S. Co., 6 South Rep., 606.
¹⁵ Kenney v. N. Y. Cent. & H. R. Co., 7 N. Y. Supp., 255.
¹⁶ Lyle v. Manhattan R. Co., 6 N. S. Supp., 325.
¹⁷ Guthrie v. Maine Cent. R. Co., 18 Atl. Rep., 295.
¹⁸ Seese v. N. P. R. Co., 39 Fed. Rep., 487.
¹⁹ Goodrich v. N. Y. C. & H. R. Co., 22 N. E. Rep., 397.
²⁰ Hungerford v. C. M. & St. P. R. Co., 43 N. W. Rep., 324.

which position he had held since 1867. He had been in the employ of that company continuously since 1853, serving first as a freight conductor.

—Mr. Samuel H. Knight, General Agent of the Passenger Department of the Chicago & Alton in St. Louis, died at his home in that city Feb. 17, aged 58 years. With the exception of two years, between 1869 and 1871, when he was General Superintendent of the North Missouri road, Mr. Knight has been in the service of the Chicago & Alton since 1853. He had served as Paymaster, Assistant General Superintendent, Division Superintendent, then as General Superintendent of the North Missouri, and since 1871 General Agent of the Passenger Department.

—Mr. Richard N. Allen was elected president of the Allen Paper Car Wheel Co. at the annual election held Feb. 13. Mr. Allen is the inventor of the paper wheel, and is a practical mechanic. He has been a director of the company since its organization, but has not taken an active part in the management since he built the company's Chicago works a few years ago. He has given much attention to the study of the steel-tired wheel question, and enters upon his new duties familiar with the situation, and with many years of practical experience gained on some of the principal lines in the country.

Mr. William Jarvis McAlpine died at his home at New Brighton, S. I., last Sunday. His funeral at that place was attended on Wednesday by many of the most eminent civil engineers of the country, and by many other distinguished citizens. Mr. McAlpine was one of the best-known engineers of America, and his reputation was world-wide. He was born in New York city in 1812, and obtained his education in the city schools. His first engineering work of importance was upon the Erie Canal. He had charge of the Eastern division until 1846, when he became chief engineer of the dry docks of the United States Navy-yard in Brooklyn. In 1852 Mr. McAlpine was elected State Engineer of New York. In 1854 he was appointed State Railroad Commissioner. Subsequently he was acting President and Chief Engineer of the Erie Railroad, and he was at one time President of the Ohio & Mississippi. He was requested by the Emperor of Austria in 1870 to present plans for the improvement of the cataracts of the Danube River, and his plans were adopted. He was President of the American Society of Civil Engineers in 1883-89. The Chicago water-works were constructed under his supervision, and he was consulting engineer of the Toronto water-works. During the war he was connected with the military railroads.

Mr. McAlpine was not only an engineer of distinguished ability and character, but of prodigious industry. He was actively connected with a vast number of important works and has contributed very much to the literature of his profession. We hope in a future issue to give a more adequate sketch of his character and career.

ELECTIONS AND APPOINTMENTS.

Augusta, Gibson & Sandersville.—At the recent annual meeting in Augusta these directors were elected: President, R. M. Mitchell; Vice-President, R. W. Inman; directors, J. H. Alexander, H. H. Hickman, George W. Stetson, William T. Gary, William B. Young, C. H. Howard, R. M. Mitchell, R. W. Inman, Thomas Warthen, A. E. Thornton, James L. Neal, L. D. Matthews and James Stapleton. Major Hamilton Wilkens, Roadmaster of the Georgia road has been elected General Manager, with office in Augusta, Ga.

Burlington, Stillwater & St. Paul.—At a recent meeting in Stillwater, Minn., the following directors were elected: Ex-Senator D. M. Sabin, President, Stillwater, Minn.; R. H. Dixon and W. W. Keene, of Stillwater; H. C. Truesdell, Minneapolis, Minn.; and Arthur B. Townsend, New York.

Chesapeake & Ohio.—J. T. Harahan having resigned the position of General Manager, that office has been abolished. The Superintendents of Maintenance of Way, of Motive Power and of Floating Property report to the General Superintendent. All other heads of departments who have been reporting to the General Manager will report directly to the President. All new work will be exclusively in charge of L. B. Jackson, Chief Engineer.

Chicago, St. Paul & Kansas City.—The following appointments have been made: J. Berlingett is appointed Division Superintendent of the Des Moines & St. Joseph Divisions, with headquarters at Des Moines, Iowa, vice W. B. Scott, resigned. O. Cornelisen is appointed Chief Train Dispatcher, with headquarters at Oelwein, Iowa, vice J. Berlingett, transferred.

Cleveland, Cincinnati, Chicago & St. Louis.—A circular has been issued announcing that Robert Blee having resigned the position of General Superintendent, that office has been abolished. All heads of departments heretofore reporting to the General Superintendent, now report to Mr. E. A. Peck, Assistant General Superintendent, and he to William M. Green, General Manager.

Coudersport, Galeton & Ansonia.—The incorporators are: F. W. Knox, Coudersport, Pa., President; F. H. Arnold, Port Allegheny, Pa.; W. K. Jones, B. A. McClure, A. B. Mann, M. S. Thompson, John Ormesod, M. A. Pinney and James L. Knox, all of Coudersport.

Cumberland Railway & Coal Co.—The old board of directors was re-elected at the annual meeting last week.

Georgia.—W. M. Robinson has been appointed Road Master, with office at Augusta, Ga., to succeed Harlton Wilkins, who resigned to become General Manager of the Augusta, Gibson & Sandersville. John W. Bell, Track Supervisor at Harlem, Ga., has been appointed to succeed Mr. Robinson as Track Supervisor, with office at Covington, Ga.

Gulf, Brazos Valley & Pacific.—These officers were recently elected at a meeting in Waco, Tex.: C. W. White, President; E. J. Gurley, Vice President and Treasurer; G. B. Gurley, Chief Engineer; W. H. Ross, General Manager; H. M. Taylor, Secretary.

Kingston & Pembroke.—At the annual meeting of the company held in Kingston, Ont., the following were elected directors: R. P. Flower and J. D. Flower, New York; C. H. Porter, Chicago; B. W. Folger, M. P. Folger, C. F. Gildersleeve, J. Swift, W. Nickle and G. A. Kirkpatrick, of Kingston.

Little Rock Belt.—The officers of this road recently organized at Little Rock, Ark., are: Silas C. Martin, President; J. A. Martin, Secretary; H. G. Martin, Treasurer, and J. A. Watkins, Attorney.

Louisville, Cincinnati & Dayton.—William Matthews, of Louisville, has been elected President, to succeed J. C. Fawcett, who resigned to become President of the construction company.

Lowell & Andover.—At the annual meeting of the road held in Lowell, Mass., the following directors were elected: Frederick Ayer, President; Benjamin Walker, Treasurer and Clerk; George Ripley, F. F. Ayer, E. M. Sargent, Jacob Nichols, A. P. Bonney, O. H. Moulton, P. C. Gates and J. T. Furber.

Moosilauke.—These officers have been elected: John H. Pearson, Concord, N. H., President; Samuel B. Page, Woodsville, N. H., Clerk; Ezra B. Mann, Woodsville, N. H., Treasurer and Superintendent; Frank W. Conn, Concord, N. H., Chief Engineer.

New York, Lake Erie & Western.—Charles E. Fuller, Jr., has been appointed Master Mechanic of the Eastern division of the road, with office at Jersey City, vice G. W. West, resigned to become Superintendent of Motive Power of the New York, Ontario & Western.

New York & Northern.—The title of H. H. Vreeland, Superintendent, has been changed to that of General Superintendent. The General Freight and Passenger Agent now reports to him instead of to the President.

New Orleans Belt.—The company has been incorporated by J. E. Auvray, Hugh Flynn, Frank J. Lewis, N. D. McDonald and others.

New York, Philadelphia & Norfolk.—At the annual meeting of the company, held in Philadelphia, Pa., Feb. 11, the following directors were elected: A. J. Cassatt, Wm. L. Scott, Wm. A. Patton, J. G. Cassatt, U. H. Painter, C. A. Griscom and R. H. Townsend, Jr. The directors elected the following officers: President, A. J. Cassatt; Vice-President, Wm. A. Patton; Treasurer, J. G. Cassatt; Secretary, Wm. Carris, Jr.

Norfolk & Richmond.—The incorporators of this Virginia road are: Eugene T. Lynch, John C. Short, James L. Montgomery, William A. Miner, Robert T. Clarke, Oscar H. Short, Eugene T. Lynch, Jr., and Frank W. Allen, of New York; William H. Peters and J. T. Lawless, of Portsmouth, Va.; and William H. White and Theodore S. Garnett, of Norfolk, Va.

Peoples.—At a meeting of this Colorado company, held in Hamilton, O., Feb. 10, these directors were elected: Gov. James E. Campbell, O. V. Parrish, Israel Williams, Robert Joyce, A. F. Hume, J. B. Cornell, George Darrow, I. Williams and S. D. Fittion were elected President and Secretary, respectively.

Pavia & Eastern.—The incorporators are: Joseph Mann and Edward L. Stewart, of Danville, Ill.; John A. Glover, of Urbana, O.; William P. Lockwood, of Champaign, and Frank Richman, of Indianapolis.

Philadelphia, Germantown & Chestnut Hill.—At the recent annual meeting of this road the following directors were elected: President, Henry D. Welsh; Alexander Biddle, J. N. DuBarry, John P. Green, H. H. Houston, N. Parker Shortridge and John C. Sims, Jr.

Phillips & Rangely.—A. B. Gilman, Bradford, Mass., and Weston Lewis, Gardiner, Me., were elected directors of the road at a meeting held last week.

Pittsburgh, Fort Wayne & Chicago.—Thomas Butler, for many years Foreman of the round-houses in Fort Wayne, Ind., has been promoted to the position of Master Mechanic of the shops at Crestline, O.

Pittsburgh & Western.—H. C. Broughton has removed his headquarters from Pittsburgh, to New Castle, Pa.

Pittsburgh, West Virginia & Potts Valley.—The incorporators of this Virginia road are: Daniel W. Crosby, Daniel E. Damon, Gideon F. Holmes, Henry S. Walker, and George S. Crouch.

St. Louis, Arkansas & Texas.—D. Miller, General Freight and Passenger Agent, has been appointed Traffic Manager of the system in Missouri, Arkansas and Louisiana. L. F. Day, Assistant General Freight and Passenger Agent at Fort Worth, has been appointed General Freight Agent, and E. W. La Beaume, Assistant General Passenger Agent, has been appointed General Passenger Agent. All will have headquarters in St. Louis. R. H. Vaughn, formerly Chief Clerk in the General Freight Office, has been appointed General Freight Agent of the lines in Texas, and W. H. Winfield, General Agent of the Passenger Department at Texarkana, has been made General Passenger Agent for the lines in Texas, both with headquarters at Texarkana.

H. D. Milton has been appointed Superintendent of Telegraph, with office at Texarkana, Tex., vice W. D. Littlefield, resigned.

St. Louis, Indianapolis & Eastern.—The Board of Directors of the consolidated company is as follows: H. H. Gardner, John L. Stockton, Thomas B. Rice, John Prindle and Ira C. Wood, of Chicago; John T. Hayes, S. R. Engle, S. P. Walker and W. R. Bottenfield, of Sullivan, Ind.

Seattle, Lake Shore & Eastern.—T. J. Heacock, of the Seattle Coal & Iron Co., has been appointed Assistant Treasurer, with office at Seattle, Wash., to succeed J. F. Shepard, who resigned to return to Kansas City.

Summit Branch.—The directors elected at the recent annual meeting were: George B. Roberts, I. J. Wistar, Amos R. Little, Joseph N. DuBarry, Wistar Morris, A. J. Cassatt, John P. Green, William J. Howard, N. P. Shortridge, William H. Uest and George F. Swift.

Talbotton & Western.—The incorporators of this Georgia road are: W. A. Little and T. E. Blanchard, of Columbus, Ga.; J. H. Pitts, Waverley Hall, Ga.; J. T. Parker, Prattburg, Ga., and W. H. Martin, R. Leonard, J. B. Gorman and J. H. Martin, of Talbotton, Ga.

Wilmington & Weldon.—At a meeting at Baltimore, Md., Feb. 12, the directors elected Warren G. Elliott President, to succeed R. R. Bridges, deceased.

OLD AND NEW ROADS.

Abbeville & Waycross.—The preliminary survey for this road has been completed from Abbeville, on the Savannah, Americus & Montgomery, south to Douglas, Coffee County, a distance of about 40 miles. The survey is now in progress between Douglas and Waycross, the southern terminus. L. Johnson, of Savannah, is General Manager.

Adirondack.—A meeting of the stockholders will be held in New York City, March 14, to consider the question of issuing \$2,000,000 of four per cent. first-mortgage

bonds, to be used in retiring the second-mortgage bond certificates issued under the reorganization agreement, by issuing to each of the holders thereof first-mortgage bonds to the amount of 50 per cent. of the certificates held by them. The remainder of the proceeds of the bonds are to be used to extend the road.

Augusta, Gibson & Sandersville.—The Richmond & West Point Terminal Co. is said to have secured enough of the stock to give it control of the company. The road is narrow gauge, and extends from Augusta to Sandersville, Ga., 80 miles.

Baltimore & Drum Point.—The road will soon be completed to Friendship, in the southern part of Anne Arundel County, Md. A large force is engaged in constructing the line through Anne Arundel and Calvert counties, and the work is making rapid progress.

Baltimore & Ohio.—The following is the report of the approximated earnings and expenses of the company for January, 1890, compared with the same month of 1889: Earnings 1889, \$1,606,318, and 1890, \$1,890,737, an increase of \$284,419; expenses 1889, \$1,262,617, and 1890, \$1,346,318, an increase of \$83,701; net 1889, \$343,701, and 1890, \$544,419, an increase of \$200,718. The earnings and expenses for the four months of the fiscal year 1889-90, compared with the same months of the fiscal year 1888-89 (January, 1890, approximated), are as follows: Earnings 1889, \$6,825,151, and 1890, \$5,233,661, an increase of \$1,403,510; expenses 1889, \$4,923,442, and 1890, \$5,403,905, an increase of \$480,463; net 1889, \$1,901,709, and 1890, \$2,829,756, an increase of \$928,047.

Belleville & Lake Nipissing.—The Dominion Government has been asked to grant a subsidy of \$3,200 per mile on a proposed extension to Bridgewater, Ont.

Black Hills & Fort Pierre.—The company has advertised for cross ties for a 10-mile extension to connect with the Fremont, Elkhorn & Missouri Valley.

Bracebridge & Baysville Colonization.—A company has been organized under this title to construct a line from Baysville, Ont., to connect with the Grand Trunk at Bracebridge, a distance of 11 miles.

British Columbia.—Application has been made to the Provincial legislature for a charter for a line from Ashcroft, B. C., on the Canadian Pacific, north and northwesterly, along the Bonaparte River, to Barker-ville, in the District of Cariboo.

Canadian Pacific.—The surveyors who started last October to make a reconnaissance from Revelstock, B. C., south along the Columbia River, reached Colville, Wash., on the Spokane Falls & Northern, last week.

Cape Fear & Yadkin Valley.—The completion of the extension from Fayetteville to Wilmington, N. C., was noted last week. The first through train over the entire road, from Mt. Airy to Wilmington, was run Feb. 17. Work has been begun on an extension from Mt. Airy, north, to connect with the line being built by the Norfolk & Western, from Ivanhoe, Va., south.

Catoosa.—The company was organized last week at Ringgold, Ga., to build a short road for passenger traffic from Ringgold to the Chickamauga battle field, near Chattanooga, a distance of 12 miles. The surveys have been made and it is stated that nearly all the right of way has been secured. It will connect with a road to be built from Chattanooga by M. Black & Co.

Centralia & Eastern.—It is announced that grading will begin in a few weeks on this road at a point a few miles east of Centralia, Wash. The grading will be pushed in both directions, east to the coal fields and west to Centralia. F. Erickson will have the first work on the road.

Central Ontario.—The company has asked the Dominion Parliament to authorize a new issue of bonds on its present line to the extent of \$30,000 per mile, to take up the present bonds and the unpaid interest coupons, and also to secure funds for building the proposed extension from Coe Hill to Sudbury, Ont.

Chateaugay.—The company is said to have secured the right of way through the Adirondacks from Saranac Lake to Lake Placid, N. Y., for a short extension of the road to be completed by July 1.

Chattanooga Southern.—F. B. Redmond, of Chattanooga, has the contract for building the section from Chattanooga to McLemores Cove, Ga., 25 miles, referred to last week. The work of construction has already commenced. C. E. James, of Chattanooga, is President of the construction company which is building the line.

Chicago, Rock Island & Pacific.—The company on Feb. 17, opened the extension of its southwestern line in Indian Territory from Okarche to El Reno, and trains are now running regularly to the latter point. Agencies have been established at Enid, Hennessey, Kingfisher, Okarche, and El Reno. The distance from Pond Creek to El Reno is 83½ miles.

Cleveland, St. Louis & Kansas City.—The Farmers' Loan & Trust Co., of New York, has made application in the United States Circuit Court at St. Louis for the appointment of a receiver for the Central Missouri, of which the above company is a reorganization.

The road is now in operation between St. Charles and Hamburg, Mo., 16 miles, but has a charter to build across the state of Missouri from Alton to Kansas City, with branches. The Central Missouri, on June 1, 1887, issued \$8,000,000 of 40-year three per cent. bonds, of which \$250,000 were sold. To secure them, the Farmers' Loan & Trust Co., as trustee, received a mortgage on all the property of the company. On March 28, 1888, the property of the Central Missouri was sold to the Cleveland, St. Louis & Kansas City, and an arrangement was made with the holders of Central Missouri bonds, by which they were to exchange them for an issue of \$7,000,000 bonds of the new company, bearing five per cent. interest. This arrangement was never consummated by the surrender and cancellation of the Central Missouri bonds, the Farmers' Loan and Trust Co. contends, but these allegations are denied by the defendants.

Columbus, Lima & Milwaukee.—The company has filed in the Recorder's office at Columbus, O., a mortgage for \$7,500,000 on the property of the company, in favor of the Atlantic Trust Co., of New York. The road is to extend from the Hocking Valley coal regions in Ohio through Columbus, Lima and Defiance to Saugatuck, Mich. It is stated that the section between Lima and Defiance, 43 miles, which has been graded, will be ready for operation by March 1.

Corvallis, Brownsville & Eastern.—This company has filed articles of incorporation in Oregon to build a road from Corvallis to Brownsville. The incorporators are Peter Hume and George A. Dysoni, of Brownsville;

T. J. Black, of Halsey; and J. K. Bryson, J. B. Lee, and James A. Canthorn, of Corvallis. The survey for the line will begin at once.

Coudersport, Galeton & Ansonio.—This company has been incorporated in Pennsylvania, to build a road from Galeton, Potter County, Pa., on the Addison & Pennsylvania, east to Ansonio, Tioga County, on the Fallbrook Coal Co.'s road. The distance is 13 miles. The capital stock is \$150,000. F. W. Knox, of Coudersport, is President.

Covington & Macon.—A mortgage in favor of the New York Security & Trust Co., on the proposed extension of this road from Machen, westerly through Jackson and Griffin, Ga., a distance of 40 miles, has been recorded in Georgia the past few weeks.

Cumberland.—The Kentucky legislature has been asked to charter this company to build a road from a point on the Kentucky Central, Cincinnati Southern, or Louisville & Nashville to the Tennessee State line. J. C. Rodimer, D. W. Vandever, of Louisville, and others are incorporators.

Darien Short Line.—The tracklaying on the road has been finished for about 11 miles, from Belleville, Ga., into a pine forest in Liberty County, Ga. Work is not now in progress, but will be resumed when the rails, which have been ordered, arrive.

Decatur, Chesapeake & New Orleans.—The directors have agreed to have the road built from Shelbyville through Booneville and Fayetteville to Decatur, Ala., by Oct. 1, next, if the company is voted a subscription of \$350,000 of its capital stock, by Bedford County, Tenn., in which Shelbyville is situated.

Denver, Texas & Ft. Worth.—A contract will soon be let for building a Southern extension of the Maxwell branch from its present terminus, 14 miles from Trinidad, Col., for a distance of 31 miles through the timber and coal lands of the Maxwell grant. It is stated that a further extension of the branch southwest in the direction of Las Vegas, N. M., will soon be commenced.

Des Moines & Northern.—Standard gauge trains began running between Des Moines and Boone, Ia., 42 miles, Feb. 18, the work of changing the gauge having been completed by that date, and the new rolling-stock having been delivered. An agreement made with the Chicago, Milwaukee & St. Paul gives that company running rights over the road into Des Moines.

Fort Madison & Northwestern.—Judge Love, of the United States Circuit Court, at Keokuk, Ia., has again ordered the sale of the road. The sale will be made in Fort Madison, Feb. 25. This will be the third attempt to dispose of the property, the previous sales not having been confirmed. The decree of Sept. 21, 1889, has been modified by changing the classes of the indebtedness.

Georgia, Carolina & Northern.—The section between Chester and Broad River, 23 miles, has been opened for traffic. Sixty-seven miles of the road, from Monroe, N. C., to the Broad River, is now being operated. The contracts for the section in Elbert County, Ga., between the Savannah River and Elberton, are reported as being let this week.

Georgia Southern & Florida.—Tracklaying between Lake City, Fla., and Palatka was completed last week. Trains will begin running in a short time on the entire road from Macon to Palatka, and thence to Jacksonville over the tracks of the Florida Central & Peninsula.

Gulf, Brazos Valley & Pacific.—This company proposes to build a road about 19 miles long from a point on the Texas & Pacific, northwest through coal lands to Mineral Wells. Further extensions of the line from Mineral Wells northwest and south from the junction of the Texas & Pacific are proposed, and will be built after the line to Mineral Wells has been finished. C. W. White, of Waco, is President and G. B. Gurley is Chief Engineer.

Haines Medina Valley.—This company has been organized to build a short road from Lacoste, on the Galveston, Harrisburg & San Antonio, northwest to Castroville, Tex., which was referred to last week, under the heading of New Roads. The survey has been made and the right of way partly cleared. Grading will begin immediately. Charles Haines, of Kinderhook, N. Y., is building the line.

Houston, Central Arkansas & Northern.—The Northern Division of this road which is now controlled by the Missouri Pacific, has been completed from Dermott, Ark., south for a distance of 25 miles and the force at work on that section has been removed north to the section between McGehee and Dermott, eight miles. Work is also in progress in Louisiana on the southern division of the road from Bastrop, La., north toward Dermott. About 65 miles of the road in Louisiana is already completed. It is expected to have the two divisions connected by June 1. The survey is now being made for continuing the line south through Winfield to Alexandria on the Texas & Pacific.

Idaho, North & South.—The survey for this recently chartered road is to be commenced within thirty days. When it has been completed the company expects to let the contracts for building 120 miles of the road, 40 miles on the section north of Nampa, Idaho, and 80 miles on the section south of that place. James A. McGee, of Nampa, is Secretary.

Illinois Central.—The earnings from traffic for the seven months ending Jan. 31 (January, 1890, estimated), were as follows:

	1889.	1888.	Inc.
Aver. miles operated.....	2,275	1,890	*285
Gross earnings.....	\$8,925,764	\$7,498,029	\$1,427,735
Oper. exp. and taxes.....	5,234,749	4,635,386	649,363
Perm. impr. paid from income.....	194,746	168,696	26,050
Total.....	\$5,479,495	\$4,804,082	\$675,413
Net earnings.....	3,446,269	2,693,947	752,322

* The operations of the Chicago, Madison & Northern (222 miles) and the Memphis Division (100 miles), are included for six months from Jan. 1, 1889.

The Dubuque & Sioux City reports its gross and net earnings for the seven months ending Jan. 31, 1890, and 1889, as follows, (Jan., 1890, estimated):

	D. & S. C.	Cedar Falls & Minn.
Miles.....	524	524
Gross Earnings.....	\$1,176,923	\$1,095,196
Oper. Expen. & Taxes.....	835,859	838,267
Net Earnings.....	\$341,064	\$256,929 Def.

The Dubuque & Sioux City has also expended on per-

manent improvements \$104,207, which has been charged to capital account. The amount so spent and charged for the corresponding period in 1888, was \$106,984.

Indianapolis, Decatur & Western.—The trustees of about \$2,000,000 of mortgage bonds of the road recently brought suit to have a decree entered that the property be sold in New York. The attorney for the railroad held that the court in which the suit was brought had no authority in the case, and that if the road is sold, it must be in Indianapolis. Last week a decision was handed down in which it was held that the court had jurisdiction to order the mortgage foreclosed and the sale made in New York. When reorganized the road will be known as the Indianapolis, Decatur & Quincy. The construction of the extension from Decatur to Beardstown will be begun soon after the reorganization has been completed.

Jacksonville South Eastern.—It is stated that the company proposes to build an extension from a point on its line near Litchfield, Ill., southwest to East St. Louis, and it is claimed that the extension will be completed by June 1.

Kansas City, Louisiana & Gulf.—The preliminary survey has been completed from Arcadia south along the west side of the Sabine Bayou for a distance of 60 miles. The surveyors will complete the line to the Red river in a few weeks. Press dispatches of the past week have stated that the contract to build the road has been let to a construction company which has been organized in England.

Little Rock Belt.—Incorporated in Arkansas to build a belt road at Little Rock, Ark., from a point near the eastern limits of the city southeasterly to the mouth of Fourche, following the south bank of the bayou in a southwesterly direction to a point a few miles south of the city limits, where the road will re-cross the bayou and reach the southern limits of Little Rock. The capital stock is \$500,000. S. C. Martin is President of the company.

Louisville, Cincinnati & Dayton.—A construction company has been organized with J. C. Fawcett, of Louisville, as President, to build this road between Jeffersonville and Madison, Ind. The company has not yet secured all the right of way, but as soon as this has been obtained it is stated that the construction company will begin grading.

Memphis & Atlantic.—A contract for a short section of the line between West Point and Abbott, Miss., is stated to have been let. It is also reported that a contract for building other sections of the line between Memphis and Tuscaloosa will be awarded very soon.

Mexican.—The grading has been finished for 14 miles on the Pachuca Division. Nearly 1,500 tons of steel ties and rails have arrived for the branch. The masonry will soon be completed on the first 12 miles. It is being put in with great care, and therefore delays the work. The branch is being built in a most substantial and thorough manner.

Mexican Roads.—The construction of the proposed road from Matamoros to Matuhula will soon begin. The route is through Villa de Mendez, Cruillas and Burgos on the Conchos River, San Nicholas, San Carlos, Villagran, Hidalgo, Padilla, Güemes and Victoria, and Linares, on the Monterey & Mexican road to Matuhula, in the state of San Luis Potosi. The concessionaires are Gen. Pedro Martinez and H. Dávila.

Midland Pacific.—An officer of the company states that the road is merely a paper enterprise just at present. It has been organized more for the purpose of exploring the country between Missouri River and Puget Sound than for anything else. The money has been subscribed for preliminary examination of country, but this is all.

Mobile, Jackson & Kansas City.—The city of Mobile has raised a subscription of \$125,000 to the preferred stock of the road to secure the construction of the line from Mobile through Hattiesburg to Jackson, Miss., a distance of about 170 miles. It is stated that the construction company, which has undertaken to build the line, has been organized in New York.

Nebraska Central.—The company has filed amended articles of incorporation in Nebraska to extend the road through Douglass County to a point on the Missouri River, and also to erect a bridge over the Missouri River near Omaha. The capital stock has been increased to \$4,000,000.

Newfoundland.—Four thousand men are reported as at work on this Government line and the work will go on throughout the winter, if the weather is not too severe. A loan of \$1,000,000 will be needed for the first year. The survey to Hall's Bay has been completed and the estimates are now being made. According to the act passed last session, tenders for construction are to be asked for, with a view to building the line under a contract. The men now at work are being employed by the Government.

New Orleans Belt.—The city council of New Orleans has passed an ordinance for a belt steam railroad. It will begin at the river on the north, make a complete circuit of the suburbs, and reach the river to the south of the city. The ordinance provides that the road shall be open to the equal and unobstructed use of all railroads on the same terms, "except roads found discriminating against the city." The charge for transporting cars over the line is not to exceed \$2 a car. Annual returns shall be made to the city, and when the profit exceeds six per cent. charges shall be reduced. It shall be built under the city's specifications, and conform to city regulations as to streets, drainage, etc. The franchise is for 50 years, and proposals are invited for the construction of the work.

New Orleans & Northwestern.—Teams and scrapers have been arriving at Rayville, Richland Co., La., for some time past, and grading will shortly commence at that end of the line, southeast from the connection with the Vicksburg, Shreveport & Pacific, to connect with the section being built from Vidalia.

New Roads.—A bill has been introduced in the Maryland Legislature to authorize the residents of Caroline County to vote on a proposition to issue \$40,000 in 4 per cent. county bonds for an equal amount of the stock of a company which proposes to build a road from Greensborough on the Delaware & Chesapeake south through Hobbs, Andersonstown, Denton and Concord to Federalburg, on the Philadelphia, Wilmington & Baltimore, a distance of 22 miles. It is stated that the Pennsylvania has agreed to operate the line when built. A similar proposition was voted on by the county several

years ago, but was not carried. It is believed that the causes which led to its defeat at that time will not operate now. Phillip W. Downes, of Denton, is interested in the project.

The engineers who have been surveying the road between Sherman, Tex., and Ardmore, I. T., on the Atchison, Topeka & Santa Fe, a distance of 54 miles, completed their work last week.

Norfolk & Richmond.—This is the name of the company which has a bill before the Virginia Legislature to build a road from a point on the western side of the Elizabeth River, near the city of Portsmouth, Va., along the south side of James River, to Richmond. The capital stock is \$100,000.

North East Pennsylvania.—John Jameson of Bloomsburg, Pa., has the contract for grading the extension from Hartsville to New Hope, Pa., on the Delaware River opposite Lambertville, N. J., a distance of 16 miles. 70 lb. rails are to be used on the extension, and it is expected that it will be completed and ready for operation by August 1.

Northern Pacific.—The Northern Pacific & Montana has been extended from De Smet, near Missoula, on the Rocky Mountain division of the main line of the Northern Pacific, in a westerly direction to Petty Creek, Mont., a distance of 25 miles. The stations opened are Grass Valley, Frenchtown, Huson and Petty Creek. This line is being built to Mullan, Idaho, 140 miles west of Missoula.

Old Colony.—The Rhode Island House of Representatives has under consideration a bill amending the charter of the Providence, Warren & Bristol, permitting it to extend its line from Crawford street to the proposed union depot in Providence, R. I., under the terminal facilities plan, by means of an elevated structure from India street, by way of South Water street. An amendment was passed requiring approval of the plan by the city council of Providence.

Pennsylvania.—The extension to Brown's Mills, N. J., referred to last week, was opened for business Feb. 15 and will be operated as part of the Philadelphia & Long Branch road. It begins at a point 30 miles from Camden, and extends a distance of 1.79 miles to Brown's Mills, in the Pines. There are no bridges, the grading is light, and the grades are easy. This extension is for the accommodation of a large winter resort hotel.

Grading is in progress on the extension of the Butler branch from Monroe, north to the Winfield ore fields. James Keenan, of Philadelphia, has the contract for grading the branch, which is eight miles long. It is to be completed by July 1, next.

Peoria & Eastern.—Articles of incorporation of the company have been filed in Illinois. It is proposed to build a road through the counties of Tazewell, McLean and Vermillion to the State line and thence to Indianapolis. The principal offices are to be at Danville, Ill.

Pike's Peak.—B. Lantry & Sons, contractors who are building this road up Pike's Peak, Colo., expect to have all the grading completed in a few days. The erection of the electric lights will begin at once, the poles being placed every 400 feet. If necessary the tracklaying can then proceed during the night time as well as by day.

Pittsburgh, West Virginia & Potts Valley.—This company has applied to the Virginia Legislature for articles of incorporation to build a road from a point in Giles County, Va., in the western part of the State, north to Grafton, W. Va. A branch is proposed from a point on this line west to Parkersburg, W. Va.

Portsmouth & Dover.—The city of Portsmouth, N. H., has sold the 1,000 shares of the stock of this company, which it held, to Frank Jones, President of the Boston & Maine, for \$121,375. The road is being operated by the Boston & Maine under an assignment of the lease which is held by the Eastern, of Massachusetts.

Portsmouth & South Mills.—A bill has been introduced in the Virginia Senate to incorporate the Portsmouth & South Mills Railway & Improvement Co. The company is to build a railroad from a point on the Elizabeth River, near Portsmouth, to South Mills, Camden County, N. C.

Qu'Appelle, Long Lake & Saskatchewan.—The bill recently introduced in the Dominion Parliament, to ratify the agreement made last August for the operation of this road by the Canadian Pacific, and referred to last week, has passed its first reading. The road is building from Regina north to Prince Albert. It has a bonus of 6,400 acres a mile, or of 2,208,000, from the Government, and under an act passed last session a further grant of \$80,000 a year for 20 years, if the mails are carried free, and the road is completed to Prince Albert by November, 1892. The bill now before Parliament provides that the company is to complete the road under the terms of the agreement with the government, so as to earn the land and money subsidies, and to transfer the road in sections as completed to the Canadian Pacific to operate until Feb. 1, 1896. The Canadian Pacific is to have control of 200,000 acres of the land subsidy, which may be sold for not less than \$1.50 per acre. The company may issue bonds to the extent of \$15,000 per mile. The Canadian Pacific is granted power to purchase the road if it so decides. It is to pay the interest on the bonds to be issued. The company is to be entitled to dispose of half of its land grant at once.

Work on the road will be resumed by the contractors, James Ross & Co., next month. The rails have been laid for 113 miles from Regina and the road graded for 40 miles further on. This leaves 90 miles yet to grade to reach Prince Albert. By resuming the tracklaying in March the contractors hope to reach Saskatchewan in May and Prince Albert in September. The contractors at present have large gangs of men getting out ties and bridge timber in the Duck Lake district. It is claimed that 1,500 men will be at work when the weather becomes mild.

Quebec & Lake St. John.—The company has asked the Dominion Government for a grant of \$3,200 per mile for an extension of the road from the present terminus at Chambord Junction to Chicoutimi and St. Alphonse, where there is deep water connection with the Saguenay River.

Rapid City, Harney Peak & Southwestern.—The grading will begin very soon on the road from Rapid City on the Fremont, Elkhorn & Missouri Valley south-west to Hill City and Custer City, S. Dak.

Richmond, Nicholasville, Irvine & Beattyville.—The entire line from Versailles through Richmond and Nicholasville to Beattyville, a distance of 95 miles, is now under contract. Howan, McFadden & Cassidy have

the first 16 miles from Versailles to Nicholasville, and D. Shanahan & Co., of Louisville, have the contract for the 79 miles from Nicholasville to Beattyville. P. Bruster & Co., of St. Louis, have a sub-contract at Versailles. The grading has been completed for 30 miles from Nicholasville to a point some distance beyond Richmond. It is expected to have the entire road ready for operation the latter part of the summer.

Rome.—The Central Trust Co., of New York, has been given a mortgage on this road to secure an issue of bonds to the amount of \$2,000,000, the proceeds of which are to be used in building extensions and branch roads and in purchasing new equipment.

St. Louis, Arkansas & Texas.—The Olcott (Central Trust Co.) Committee on the reorganization of the company, announces that it now has sufficient securities deposited to insure the success of its plan. The time for depositing securities without penalty has been extended to March 5, in order to give holders opportunity to avail themselves of the benefits of the reorganization. After March 5, a penalty of two per cent. will be exacted from bond holders, and one per cent. from stockholders.

Seattle, Lake Shore & Eastern.—Bondholders have applied for an injunction against the delivery of any more of the bonds and stock of that company to the Seattle & Eastern Construction Co.; for the appointment of a receiver of the property of both companies, and for a decree declaring the construction contract between the two companies to be void.

Sioux Falls, Yankton & Denver.—The sum of \$70,000 has been subscribed at Yankton, S. D., and \$100,000 has been subscribed at Sioux Falls, to aid in building this road between Sioux Falls and Yankton, a distance of 60 miles. When completed, the line is to be operated by the Great Northern as an extension of the Wilmar and Sioux Falls division.

South Atlantic & Ohio.—Track laying on the section from Clinchport to Big Stone Gap, Wise County, Va., 30 miles, is being pushed rapidly, and it is expected to have the work completed in a very short time. The grading has all been finished.

South Mississippi.—This is the name of the company which is to build the proposed road from Natchez, Miss., east through Brookhaven and Monticello to Meridian, a distance of about 180 miles. A preliminary survey between Brookhaven and Monticello has been made, and it is claimed that the contracts for building this part of the line will be let early in the summer. The work is light, and though the grades have not yet been established they will not exceed 50 ft. to the mile. There will probably be two iron bridges, one a draw over the Pearl River, near Monticello. It may also be necessary to construct a tunnel 500 ft. long. Major Belton, of Holly Springs, Miss., is Chief Engineer, and R. H. Thompson, of Brookhaven, is Managing Director.

Talbotton & Western.—This company was organized last week at Talbotton, Ga. The survey for the road will soon be commenced from a point on the Georgia Midland & Gulf, near Waverly Hall, east through Talbotton and Prattburg to the Flint River. The distance is about 25 miles.

Tehuantepec.—A dispatch from the City of Mexico reports that work on the road across the Isthmus of Tehuantepec is making good progress, and that over 2,000 men are employed. About thirty miles has been completed from Coatzacoalcas on the Gulf and 50 miles on the Salina Cruz or Pacific end. The provisional bridge, 1,250 ft. long, over the Tehuantepec River, is finished. It will eventually be replaced by an iron structure.

Texas & Atlantic.—A reconnaissance has been made of that part of the line from Hughes, on the Missouri, Kansas & Texas to Atlanta and to Savannah, La., and Texarkana, Tex. Henry McLaughlin is Chief Engineer.

Toledo, Columbus & Cincinnati.—The directors made an inspection trip over the extension from Findlay to Kenton, Ohio, last week, and accepted the line. On the extension from Kenton south to Columbus the location is now being made and has been completed to a point 20 miles south of Kenton; from this point two lines will be surveyed to Columbus, one through Byhalia, and one more westerly through Mansfield and Marysville. It is stated that the company has arranged with the Columbus, Lima & Milwaukee to use the survey and right of way of that road from Marysville to Columbus.

Toledo, Findlay & Springfield.—Construction trains are now running between Bowling Green and North Baltimore, O., a distance of 15 miles. Ballasting is proceeding rapidly and will soon be finished. The line will be open for freight traffic this week. It was expected to have the line in operation between these points last month, but the construction work has been considerably delayed by rainy weather. The line is to be extended south from North Baltimore to Findlay and north from Bowling Green to Toledo, but it has not yet been decided when work on these extensions will begin.

Topeka, Westmoreland & Marysville.—The company is about to commence work on its line. It has \$120,000 in aid voted along the line, and has the right of way through the city of Topeka, and a good deal along the line already secured. A locating party will be put in the field immediately to make the final location under the direction of the Chief Engineer, Mr. Robert Giles. The contract for the grading, bridging and masonry, and tracklaying will probably be let about March 15, and the work will be pushed through to Westmoreland with as little delay as possible. The first contract will comprise about 55 miles of road. The engineers' office is at North Topeka, Kan.

Union Pacific.—The earnings of the entire system for December and the year were as follows:

Month of December:		1889.		1888.		Inc. or dec.	
Miles oper.	7,036	6,797	Inc.	239			
Gross earnings	\$3,554,364	\$3,288,068	Inc.	\$266,296			
Oper. expen.	2,595,785	2,091,038	Inc.	505,747			
Net earnings	\$957,578	\$1,197,030	Dec.	\$239,452			
*Excludes 1,324 miles water route.							
For the year to Dec. 31:		1889.		1888.		Inc. or dec.	
Gross earnings	\$30,713,903	\$30,091,115	Inc.	\$620,787			
Oper. expen.	25,015,584	24,498,097	Inc.	517,487			
Net earnings	\$14,698,319	\$14,595,018	Inc.	\$103,301			

Toronto, Hamilton & Buffalo.—The City Council of Hamilton, Ont., will submit a by-law to aid the company to the extent of \$275,000, to procure right of way through the city. The company will construct a tunnel, avoiding level crossings.

The company has petitioned the Ontario legislature or amendments to its charter to enable it to issue bonds

to the extent of \$40,000 per mile on the road now built and under contract, and also to increase the capital stock from \$1,000,000 to \$2,000,000. An extension from Hamilton to Brantford, Ont., or to a point on the Brantford, Waterloo & Lake Erie road is also proposed, and the legislature is asked to authorize the company to build it.

Utica, Gloversville & Saratoga.—Three surveys have been made of the line from Utica to Gloversville, and it is expected that the directors will adopt one of the routes this month. The line will be 95 miles long, and it is estimated that it can be built for \$23,000 per mile, including station buildings.

Virginia Roads.—The West Point, West Virginia & Potts Valley, Radford & Little River, Broadway & West Virginia and Abingdon roads have applied to the Virginia Legislature for incorporation.

A company has asked for a charter to build a road from Clifton Forge, Va., on the Chesapeake & Ohio, via Fincaisle to Roanoke.

Wabash.—It is stated that the company has decided that the branch which is to connect its main line with the Eel River Division will be built from Peru on the former line to Chili, Miami county, a distance of about 10 miles. The Peru & Detroit was organized last fall to build this road and it is stated that that company will let the contract for grading this month. The towns of Logansport, Peru, and Wabash have each been endeavoring to secure the building of the line, and all have offered inducements to the company to construct it, as it is understood that shops will be erected and division headquarters established at the point to which the division is extended.

TRAFFIC.

Chicago Traffic Affairs.

Our Chicago correspondent summarized the news there on Monday as below:

The present week, as has been predicted, will undoubtedly see the inauguration of what promises to be the most serious rate war the Western roads have indulged in for some time. The Western Freight Association has been in session for a week, endeavoring to limit the spread of reductions, but without effect. When the Chicago, Burlington & Northern announced its intention to establish a 40-cent rate, Chicago to St. Paul, on local, and 30 cents on through business, the Chicago, Milwaukee & St. Paul prepared to meet it on the 21st, supposing the notice would be given by the Burlington on the 11th. This was not done, but later in the meeting the Burlington, claiming that the St. Paul had broken the rules in announcing the rate, announced that it proposed to do the same and put the rate in effect the 17th. There was nothing to do but for the Association to meet it, which they voted to do. Then the Illinois Central announced its intention to put in a 60-cent first-class and 25-cent first-class C. L. rate, Chicago to Sioux City; the present rates being 75 and 30 cents, respectively. As Omaha and Sioux City take the same rate, it is likely to go to Omaha and from there to Lincoln and all Missouri River points, and the end is not yet.

The managers of the Interstate Commerce Railway Association have authorized a 10-cent rate on merchant iron, Chicago to Mississippi River points. They have denied the application of the Chicago, St. Paul, Minneapolis & Omaha to put in the same rate on coarse grain from Omaha to St. Paul and Minneapolis as is made from Omaha to St. Louis, and the road has appealed to the Executive Board.

The Interstate Commerce Railway Association, the Central Traffic, Western Freight, Trans-Missouri and the Trans-Continental Associations have all been in session the past week.

Chairman Midgley has given notice that the meeting of the Uniform Classification Committee will be held at Old Point Comfort, Va., Feb. 20, instead of 18.

The Chicago, Burlington & Northern has given up its passenger fight against the "Soo" line, for the present, at least.

As was expected, the recent reductions in the rates on corn from Nebraska points which were conceded by the roads are not likely to benefit the producer, as the price of corn has already commenced to go down. It is estimated that these reductions will result in a loss of revenue to the Nebraska lines on the present corn crop of over a million and a half dollars. The reductions from Kansas which went into effect the 20th inst. are likely to have a similar effect.

The committee appointed by the presidents of the Interstate Commerce Railway Association has not as yet presented its report. The managers of this Association, at their meeting last week, adopted a resolution looking toward the presentation of the report not later than Feb. 25. In view of the present complications, it is not at all likely that any immediate action looking to the reorganization of the lines can be had.

The revision of east-bound passenger rate sheets at Missouri River points, which was discussed a few weeks ago, was intended to so equalize the rates and conditions by competing routes that the payment of commissions on tickets sold over the lines in question would be stopped; and strenuous efforts were made by Chairman Blanchard and others to carry out the proposed arrangement for this purpose. It now appears, however, that the obstacles are quite complicated, and active efforts toward stopping commission payments have been for the present suspended.

Traffic Notes.

The passenger officials of the trans-continental roads report a very light tourist travel the present season, a state of things in marked contrast to that existing a year ago.

The roads centering in New Orleans have organized a car service association. A. M. Cooke, Assistant General Manager of the Louisville, New Orleans & Texas, is president of the association.

Des Moines grain shippers are petitioning the Iowa Railroad Commissioners to decide whether or not it is discrimination for railroads to charge demurrage on cars at one station and not at another.

The North Carolina Car Service Association has been organized, with headquarters at Raleigh. All the prominent roads have become members, and the demurrage rules of the general time convention are announced to go into effect March 1.

The report of the Cleveland Car-service Association shows that during January the average detention of coal cars was 2 days and 18 hours, and of other cars 2 days and 3 hours. The average detention during January of last year was over four days.

At a meeting of the General Freight Committee of the trunk lines, Monday, to discuss the subject of rates from

the seaboard to the Northwest, it was decided to withdraw all through rates to St. Paul and quote only to Chicago. This will leave the Western roads to fight out their differences among themselves. It was feared that if through tariffs were continued in force the trunk lines might become involved in possible violations of law.

It now transpires that the inauguration of the new and short-lived sleeping car line between Cincinnati and Toledo, over the Big Four, C., S. & C. and Hocking Valley, had an object, and was a success after all, even if it did fail to get any passenger business. The result of that brief competition is that hereafter the Wagner sleeping cars, as well as the Pullmans, will run on the Cincinnati, Hamilton & Dayton and Michigan Central line between Cincinnati and Detroit.—*Toledo Bee.*

The Wisconsin Central has filed notice with Chairman Walker that in consequence of the withdrawal of the Chicago & Northwestern and the Chicago, St. Paul, Minneapolis & Omaha from the Interstate Commerce Railway Association, together with the fact of the Milwaukee, Lake Shore & Western, the Milwaukee & Northern, the Green Bay, Winona & St. Paul, and the "Soo" Line not being members, the Wisconsin Central will also withdraw.

The Chicago & Alton having announced a 12½-cent rate on sheep between Kansas City and Chicago, and a 7½-cent rate to St. Louis, the Wabash followed suit and the rates were to become effective on the 22d, but later it was announced that the Alton had withdrawn its rate, and the Wabash did the same. Alton officials say, however, that the rate has not been withdrawn, but is merely held back for two weeks, until after the next meeting of the Western Freight Association.

President Samuel Sloan, of the Delaware, Lackawanna & Western, has agreed to the execution of the plans for controlling the immigrant traffic adopted by the committee of presidents. By taking this step, Mr. Sloan prevents all need of resort to arbitration, which had been ordered at the last meeting of the presidents. It will be remembered that the Lackawanna objected to accepting the plans of the association, and that Samuel Spencer was appointed arbitrator to pass upon the points in dispute. Immigrant business from New York will, therefore, be hereafter divided among the trunk lines, but will be under the supervision of the Castle Garden Joint Agency. All outside ticket offices in the First Ward will be given up, thereby removing an important element which conducted to the demoralization of rates. President Sloan has issued directions for the closing of the Lackawanna's outside offices on Feb. 23.

The Int-state Commerce Commission.

The Commission, in an opinion by Chairman Cooley, rendered its decision on Feb. 14 in the case of the Chicago, Rock Island & Pacific against the Chicago & Alton, dismissing the complaint. The case involved the protection of the complainant in its method of shipping cattle from points west of Kansas City, billed through to Chicago, and allowing them to be held over at Kansas City for an indefinite time, to try the market there. Then, if the same cattle, or others substituted in their place, were reshipped at the through rate originally agreed upon, it was held that the defendant had no right to take the reshipment from Kansas City to Chicago at the proportional rate of the original through rate. On this point the Commission held as follows:

Where property is to be transported by rail, by continuous and uninterrupted carriage from one station to another, there may be sound and legal reasons for making a charge for the through transportation which is less than the sum of the locals for the transportation of like property from point to point between such stations. But where property is billed from one station to another, with the understanding that it is to be unloaded at an intermediate station, and that whether it shall be reloaded for further carriage will depend upon the volition of the shipper or of any one who may have become purchaser, the case does not fall within the reasons governing rates on through transportation, and the carrier is not, at such intermediate points, entitled to have the carriage protected as a through shipment as against competitors.

Anthracite Coal Tonnage.

The statement of anthracite coal production for the month of January, 1890, compared with the same period last year as compiled from returns furnished by the mine operators was as follows:

	January		Dec.
	1890.	1889.	
Wyoming region	1,681,251	1,316,731	235,480
Lehigh region	486,845	536,985	50,140
Schuylkill region	713,489	768,899	55,390
Total	2,881,579	2,622,529	340,950

The stock of coal on hand at tide-water shipping points, Jan. 31st, 1890, was 1,133,927 tons; on Dec. 31, 1889, it was 1,025,107 tons, an increase of 112,820 tons.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Feb. 15, amounted to 100,775 tons, against 105,539 tons during the preceding week, a decrease of 4,764 tons, and against 66,590 tons during the corresponding week of 1889, an increase of 34,185 tons. This includes flour, grain, seeds, provisions, dressed beef, hides, wool and lumber. The following table gives the details:

	W'k to Feb. 15.		W'k to Feb. 8.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	11,468	11.4	14,626	13.9
Wabash	6,028	6.0	6,346	6.0
Lake Shore & Michigan South	18,338	18.2	22,226	21.1
Pitts., Ft. Wayne & Chicago	14,195	14.1	14,378	13.6
Chicago, St. Louis & Pitts.	10,654	10.6	7,976	7.5
Baltimore & Ohio	8,622	8.5	7,976	7.5
Chicago & Grand Trunk	10,052	10.0	11,387	10.8
New York, Chic. & St. Louis	8,330	8.3	8,651	8.2
Chicago & Atlantic	13,638	12.9	11,973	11.4
Total	100,775	100.0	105,539	100.0

Of the above shipments 4,902 tons were flour, 58,945 tons grain, 2,996 tons millstuffs, 6,769 tons cured meats, 4,624 tons lard, 8,550 tons dressed beef, 1,132 tons butter, 2,060 tons hides, 114 tons wool and 4,966 tons lumber. The three Vanderbilt lines together carried 37.9 per cent. of all the shipments, while the Pennsylvania lines carried 24.7 per cent.